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EDITORIAL INDEX—PAGE 161 BUYERS' DIRECTORY—PAGE 143 ADVERTISING INDEX—PAGE 142

CANADIAN MACHINERY AND MANUFACTURING NEWS

LIBRARY JUN 16 1922 UNIVERSITY OF TORONTO

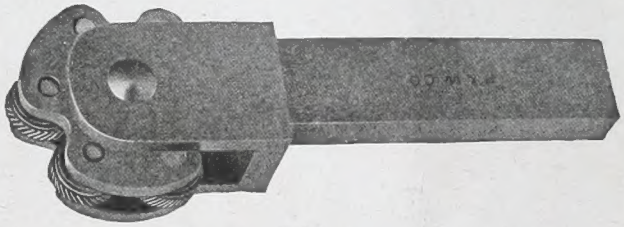
A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 1. Publication Office: Toronto, January 2, 1919 Subscription Price $3.00 per Year

QUALITY AND SERVICE
THE GEO. F. FOSS MACHINERY & SUPPLY CO. LIMITED
MONTREAL
Foss
OUR MOTTO

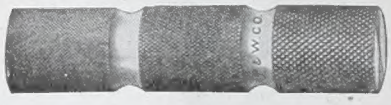
SMALL TOOLS

P. & W. Combination Lathe Knurling Tool

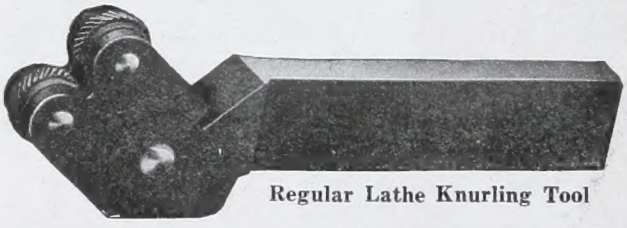


Combines Three Distinct Knurling Tools in One

You will save time by using this three-in-one Lathe Knurling Tool. It carries three pitches of knurls, fine, medium and coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.



Fine Medium Coarse



Regular Lathe Knurling Tool

PROMPT SERVICE

is assured at our nearest store where P. W. Small Tools are carried in stock. Place your order there to-day.

Precision Machine Tool—Standards & Gauges

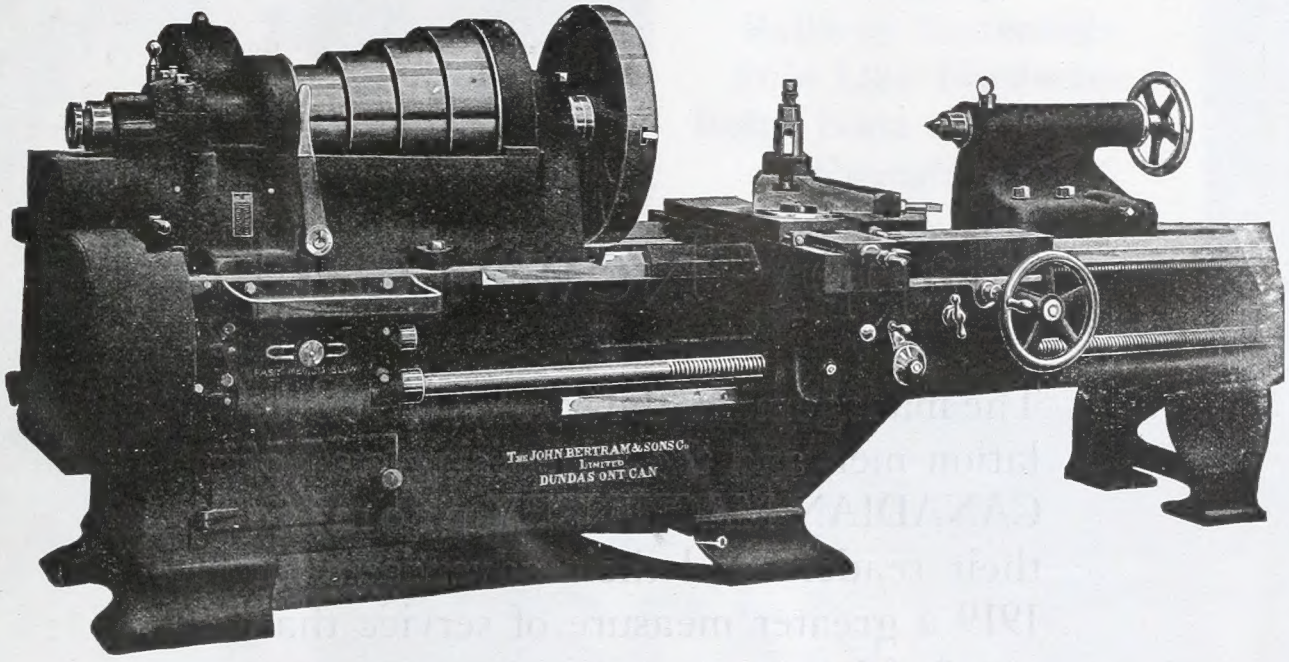
PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

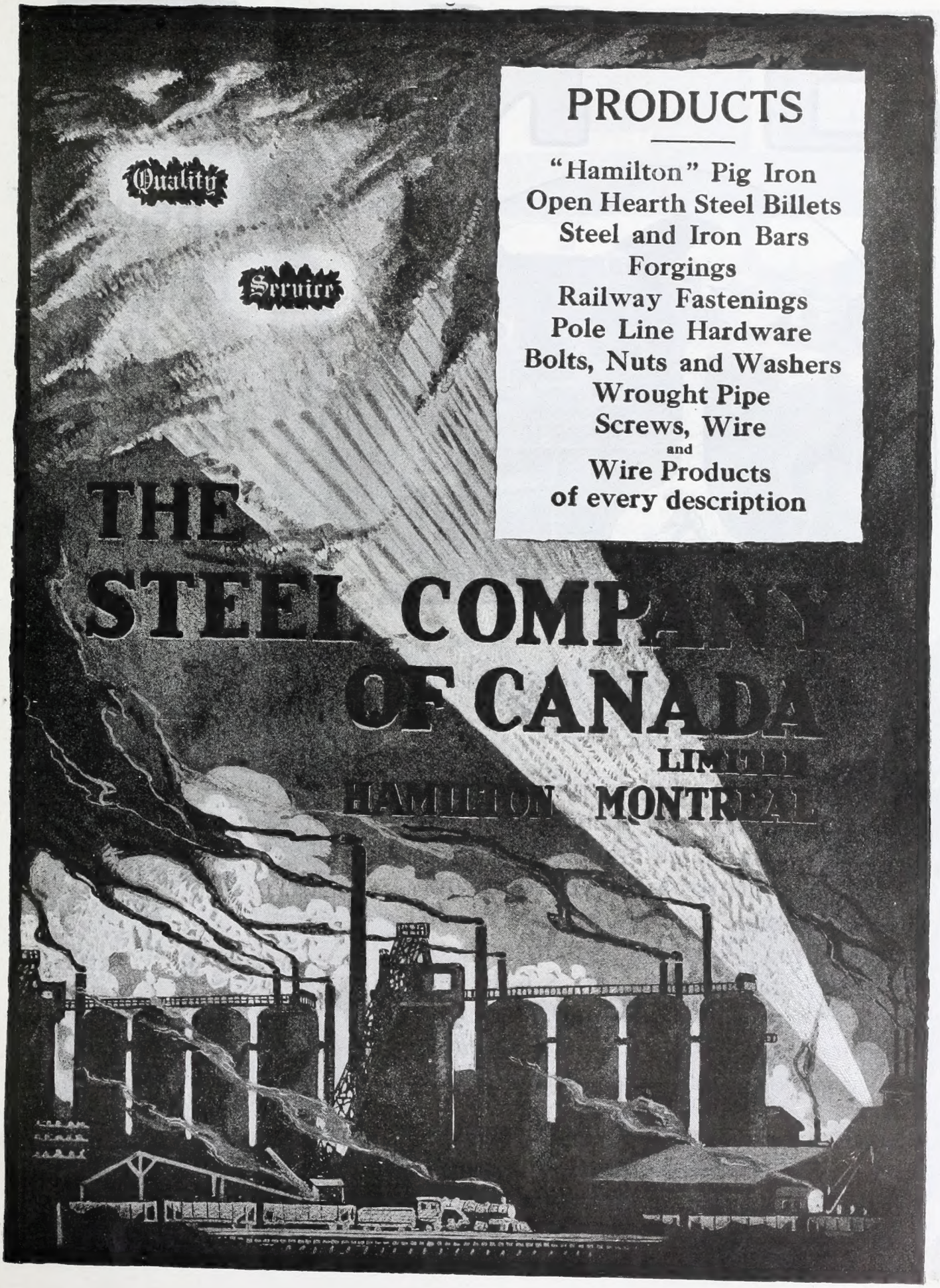
TORONTO JANUARY 2, 1919

Happy New Year!

The management, the editors, the circulation men and the advertising staff of CANADIAN MACHINERY promise their readers and their advertisers for 1919 a greater measure of service than ever before.

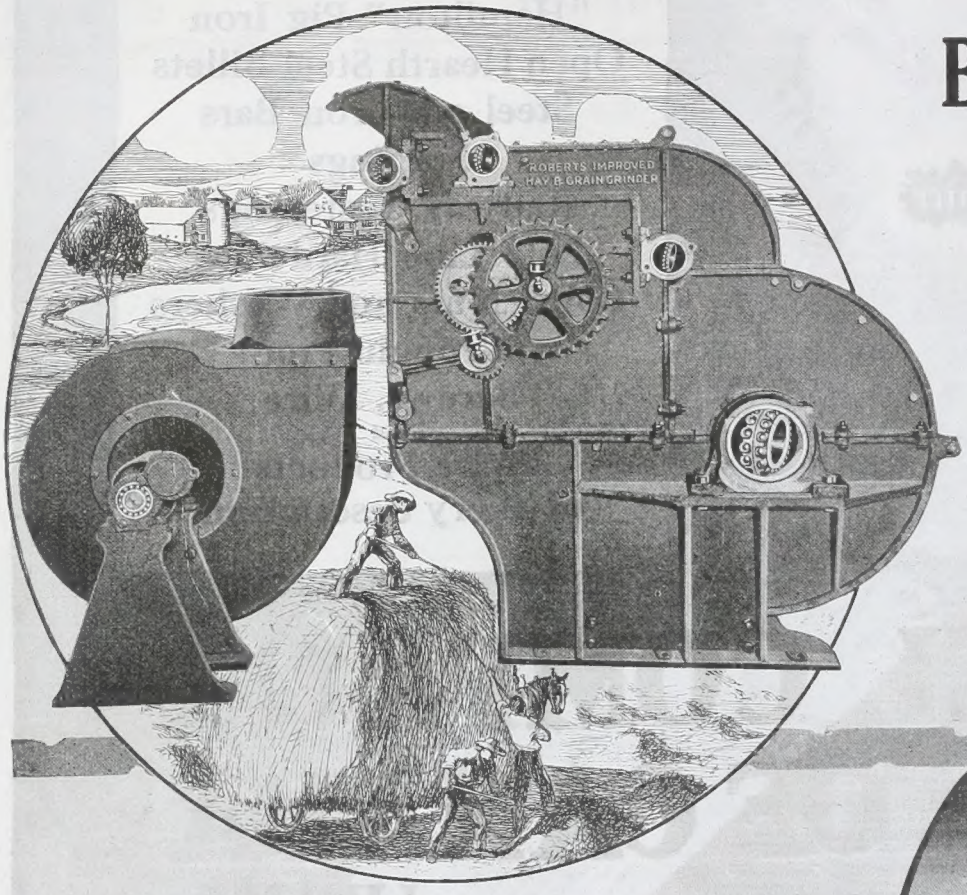
Your co-operation and good-will in the past have been appreciated. Your help in the days to come will be most welcome.

A happy and prosperous New Year to you all!

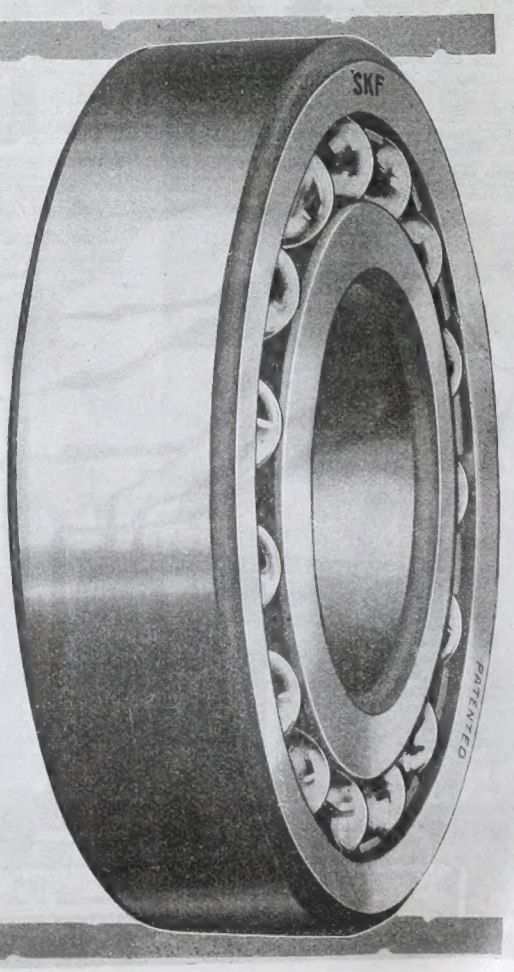

Quality
Service
PRODUCTS
"Hamilton" Pig Iron
Open Hearth Steel Billets
Steel and Iron Bars
Forgings
Railway Fastenings
Pole Line Hardware
Bolts, Nuts and Washers
Wrought Pipe
Screws, Wire
and
Wire Products
of every description
THE
STEEL COMP
OF CANADA
LIM
HAMILTON MONTR

S K F

Ball Bearing Equipped Farm Machinery



Roberts Forage Hay and Grain Grinder equipped with S K F Ball Bearings



S K F Ball Bearing equipped farm machinery is free from adjustment and continual oiling or other attention. The farmer need never worry about bearings heating or grit or dirt entering the bearings. Because of the exclusive advantages of S K F Ball Bearings they are becoming the standard for all types of farm machinery, regardless of their initial cost.

Canadian SKF Co., Limited
Toronto, Ontario
412 St. James St. W., Montreal, Que.

WILT

Every Wilt Drill is Thoroughly and Scientifically Inspected Before it is Delivered to You

Every WILT HIGH-SPEED AND CARBON TWIST DRILL is made from the very best materials by highly skilled workmen—THEN they are thoroughly and scientifically inspected after each operation.

This is the best GUARANTEE you can have that the drill delivered to you is as near perfect as it is possible to make a drill. In handling WILT DRILLS you are therefore fully protected and can guarantee to your customer that in selling him a WILT DRILL you are giving him

THE BEST THAT MONEY CAN BUY

WILT HIGH-SPEED AND CARBON TWIST DRILLS are being used in the majority of the largest plants in Canada —and to a large extent **EXCLUSIVELY.**

IT WILL PAY YOU TO BUY AND SELL THEM.

"WHERE THERE'S A WILT —THERE'S THE WAY."

WILT TWIST DRILL CO. OF CANADA, LIMITED

Walkerville - - - Ontario

London Office Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E. C. 2, England

HIGH SPEED AND CARBON TWIST DRILLS

Drills for Heavier Feeds and Greater Speeds

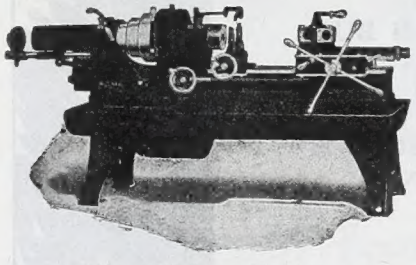
Rich Drills stand heavier feeds and greater speeds than ordinary drills. They are FORGED, not milled, and the solid bar of the best grade of steel is used—therein lies the secret of their superiority. The same quality are seen in RICH Reamers, Track Bits, Flat Drills, Drill and Reamer Chucks and Rivet Sets.

Use RICH products for better and more economical results.

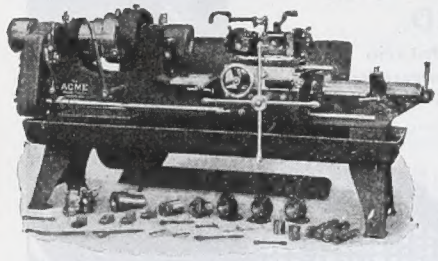
MACHINERY AND SUPPLIES — We have the facilities for adequately equipping all kinds of factories and mills. Modern ideas — quick service.

Standard Machinery & Supplies, Limited
261 Notre Dame St., Montreal
Western Representative: Wm. W. Hicks, 567 Banning Street, Winnipeg

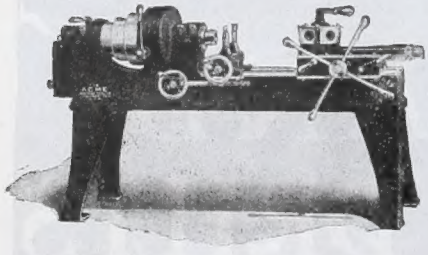
Machinery
Machine Tools
and Mill Supplies



2¼" x 11" Screw Machine.



2¼" x 26" Flat Turret Lathe with Bar Equipment.



18" Turret Lathe.

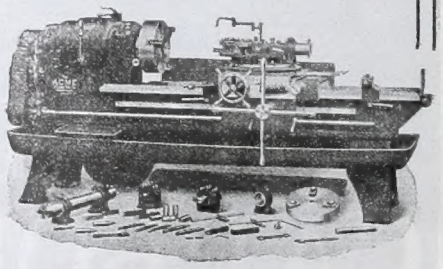
CINCINNATI Acme

Wherever Cincinnati Acme Machine Tools are in operation you'll always find the user ready to put in a good word for them—because their highly efficient service stamps them as machines of unusual merit.

Brass Working Machines
Universal Turret Lathes

Flat Turret Lathes
Screw Machines
Turret Lathes
and All Tool Accessories

When you purchase a Cincinnati Acme you are getting a tool with a well established reputation for quality, accuracy and production.



Universal Flat Turret Lathe with Chucking Equipment.

The Acme Machine Tool Co.
Cincinnati, Ohio

SIDNEY

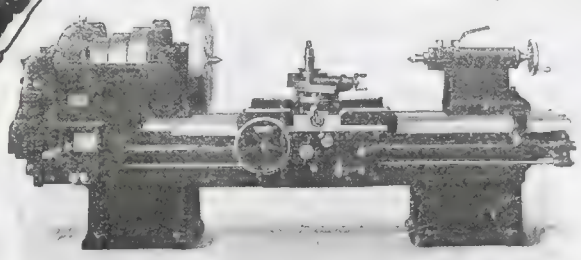
For SERVICE

Heavy Duty Lathes

The 25-inch Heavy Duty Quick Change Sidney shown below is the last word in lathe construction. Every possible improvement will be found in this late model. Bed lengths available are 10, 12, 14, 16, 18 and 20 feet. Also built with a 27-inch swing.

Easy Masters of Big Jobs

Regardless of the severity of work, dependence put on Sidney Lathes has never been misplaced. The Sidney line has made good—with a vengeance. New Bulletins just issued on 25-inch machine. Write to-day!



The Sidney Tool Company
SIDNEY, OHIO

CANADIAN AGENTS:
The Geo. F. Foss Machinery & Supply Co., Montreal, Quebec. H. W. Petrie, Limited, Toronto, Ontario.

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

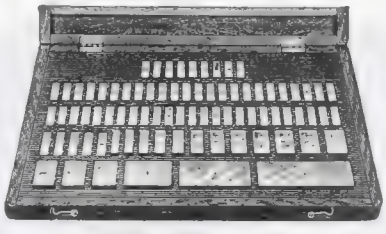
For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO
Alfred Herbert, Limited, Coventry, Agent for Great Britain

Guaranteed Accuracy .00001"



JOHANSSON GAGE BLOCKS

These Gages are the standard with such organizations as Imperial Munitions Board, Canada Cement Company, Willys-Overland Company, Dominion Arsenal, Dominion Cartridge Company, The Turnbull Elevator Mfg. Co., Holden-Morgan Co., and Brown Engineering Corp.

Any one of thousands and thousands of measurements to .0001" can be made up by any shop man in a few moments.

They take the place of less accurate tools both for producing work and checking its accuracy. One use nowadays is to set and check Johansson Adjustable Snap Gages in those shops that have taken advantage of the Limit System.

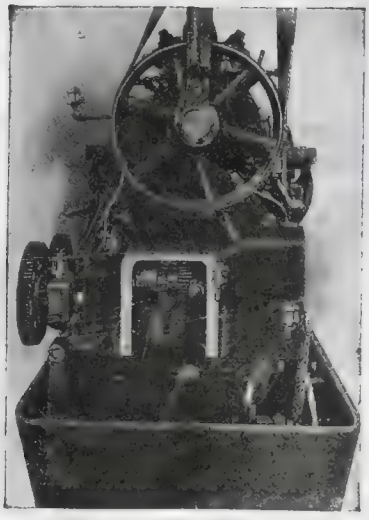
Write us for further information. Better still, let us demonstrate in your own shop.

H. E. STREETER
523 New Birks Bldg. - Montreal

Johansson Gage Blocks, Special Taps, Hobs, Reamers and Cutters; Bench Lathes, Surface Grinders, Magnetic Chucks, Prestowich Gages, Micrometers, etc.

If any advertisement interests you, tear it out now and place with letters to be answered.

THE JOHNSON FRICTION CLUTCH



Courtesy National Acme Co., Cleveland, Ohio.

WATCH

is subject to exceptional hard usage, but it gives unfailing service.

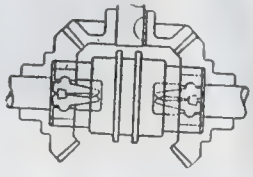
YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

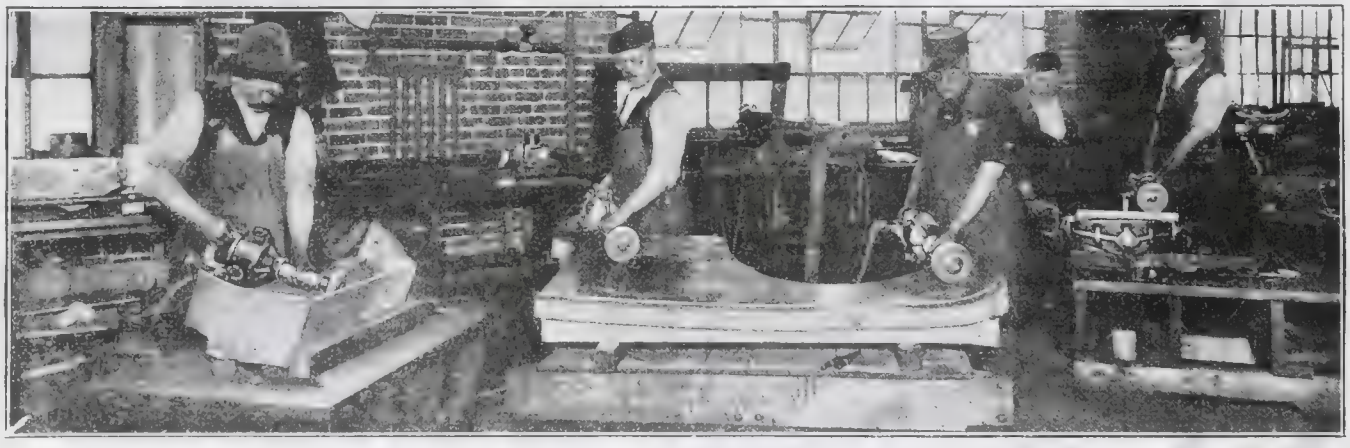
Write for our Yellow Data Sheets and Booklet, "Clutches as Applied in Machine Building"

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Ltd., Montreal and Branches. ENGLAND—The Efandem Co., Ltd., 22 Newman St., Oxford St., London, W. I, Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers, 231 Elizabeth Street, Melbourne, Victoria. JAPAN—Andrews & George Co., 10 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.



Double Clutch in Nest of Gears

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.



How One Plant Uses The "LITTLE DAVID" GRINDER

CANADIAN INGERSOLL-RAND CO., LTD.

With Offices at

SYDNEY, SHERBROOKE, MONTREAL, TORONTO, COBALT, WINNIPEG, NELSON, VANCOUVER

BETTS

HEAVY
BETTS
DUTY

A Symbol

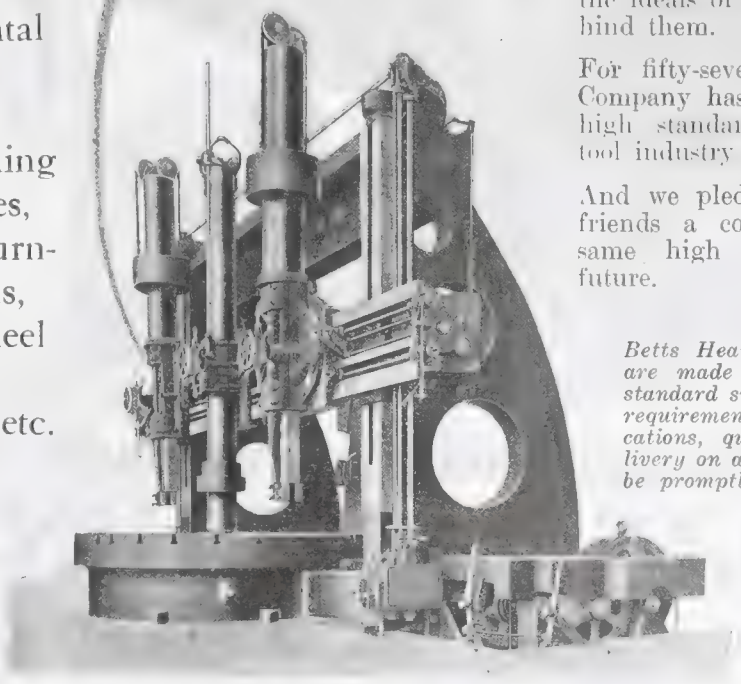
In itself means nothing. What it stands for means everything.

This symbol stands for the service built into all "Betts" Tools and the ideals of the organization behind them.

For fifty-seven years, the Betts Company has maintained a very high standard in the machine tool industry

And we pledge to our hosts of friends a continuance of these same high standards for the future.

Planers, Boring and Turning Mills, Horizontal Boring, Drilling and Milling Machines, Tire Turning Mills, Car Wheel Borers, Slotters, etc.



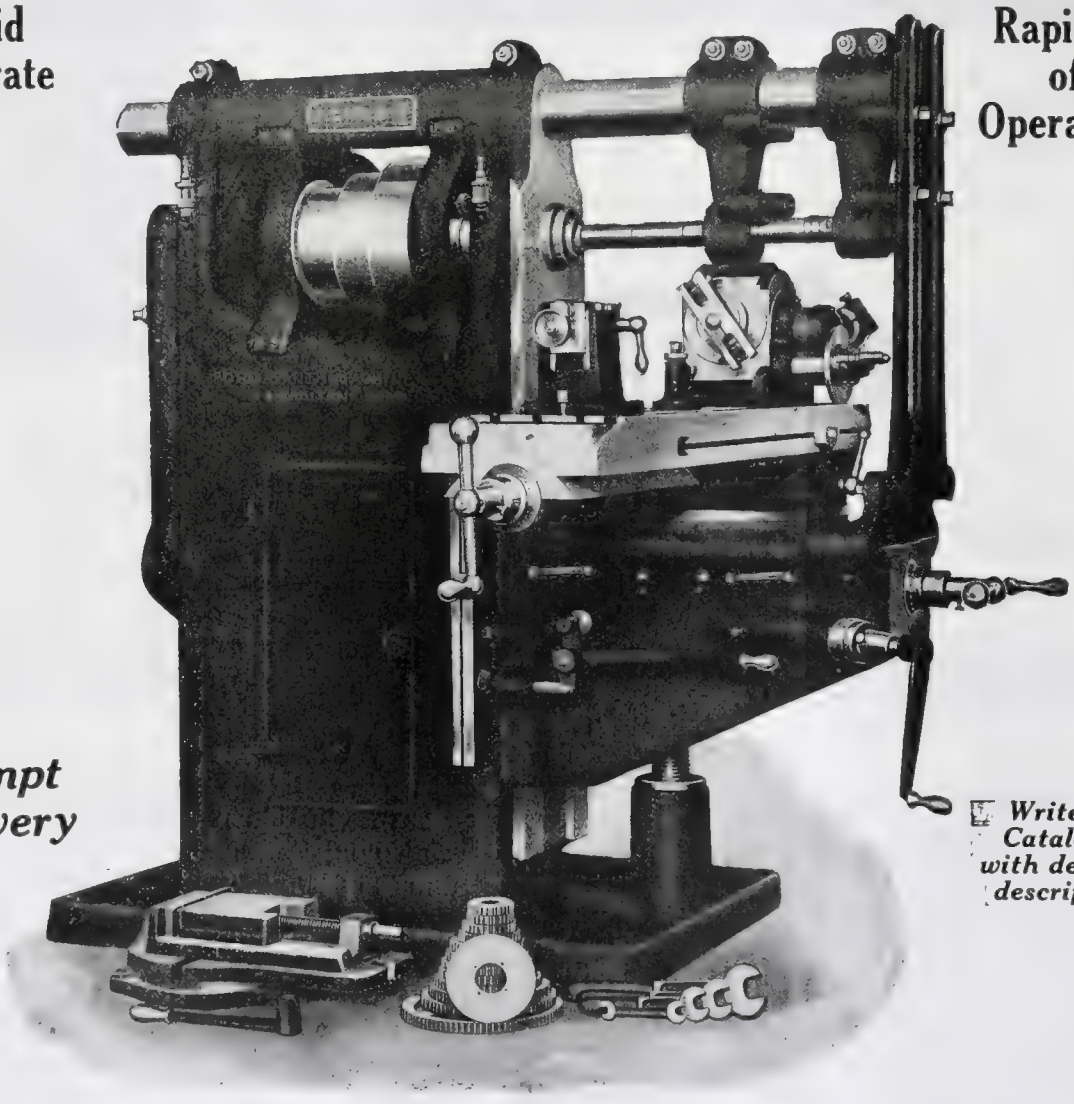
Betts Heavy Machine Tools are made in a number of standard sizes to meet every requirement. Detailed specifications, quotations and delivery on any Betts tool, will be promptly furnished.

BETTS MACHINE CO.
408 Blossom Rd. Rochester, N.Y.
Formerly of WILMINGTON. DEL.

FORD-SMITH

Rigid
Accurate

Rapidity
of
Operation



Prompt
Delivery

Write for Catalogue with detailed description

Plain and Universal
MILLING MACHINES

Floor Grinders (Belt and Motor Driven) **Disc Grinders, Polishers**
Water Tool Grinders

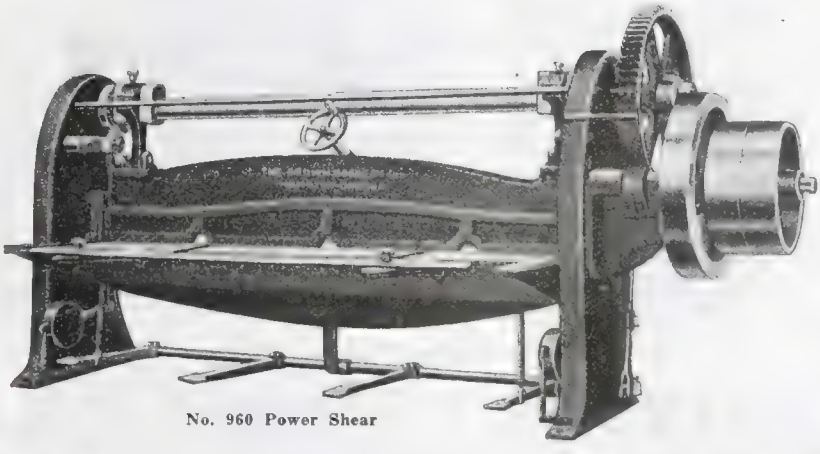
MANUFACTURED BY

The Ford-Smith Machine Co., Limited
Hamilton, Ontario, Canada

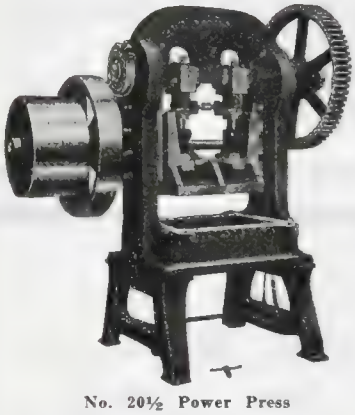
Agent for Great Britain; W. P. Storey, 3 Arundel St., London, Eng.
Agent for United States and Foreign Countries: Alf. Herbert, Limited 54 Dey St., New York

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

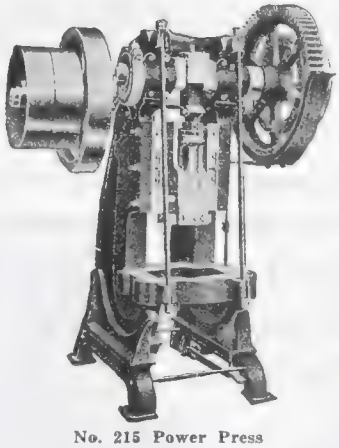
Stood The Test



No. 960 Power Shear



No. 20½ Power Press



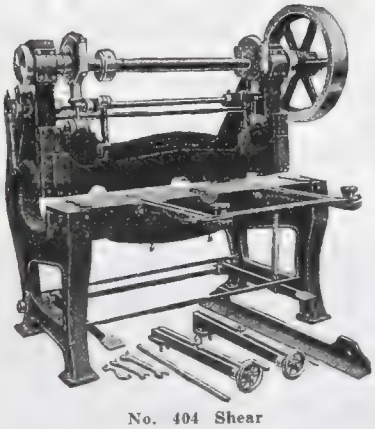
No. 215 Power Press

"B.B." Tools during the last four years have proven their superiority under the most trying conditions.

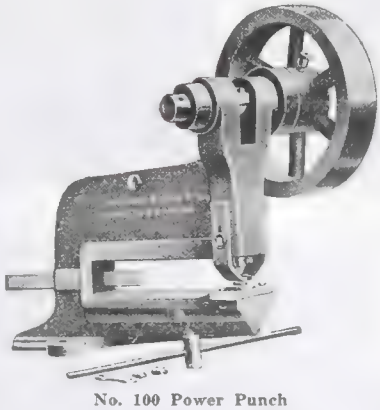
Inexperienced help and 24 hours daily service will test the best machines.

Quality that is *"built in"* on a machine is bound to assert itself under such circumstances.

Our line comprises shears of all kinds, power presses for punching, forming, embossing, blanking, etc. Tinsmith's tools and sheet metal working machines of every description, also canners' and evaporators' machinery.



No. 404 Shear



No. 100 Power Punch

The Brown-Boggs Co., Limited

Hamilton, Canada

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.

1118 Queen Street West, Toronto, Ontario

Phone Park. 250

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & CO.

Sales Agents, CLEVELAND

Canadian Office:
703 C.P.R. Bldg., Toronto

FIRTH'S

Speedicut HIGH SPEED Steel

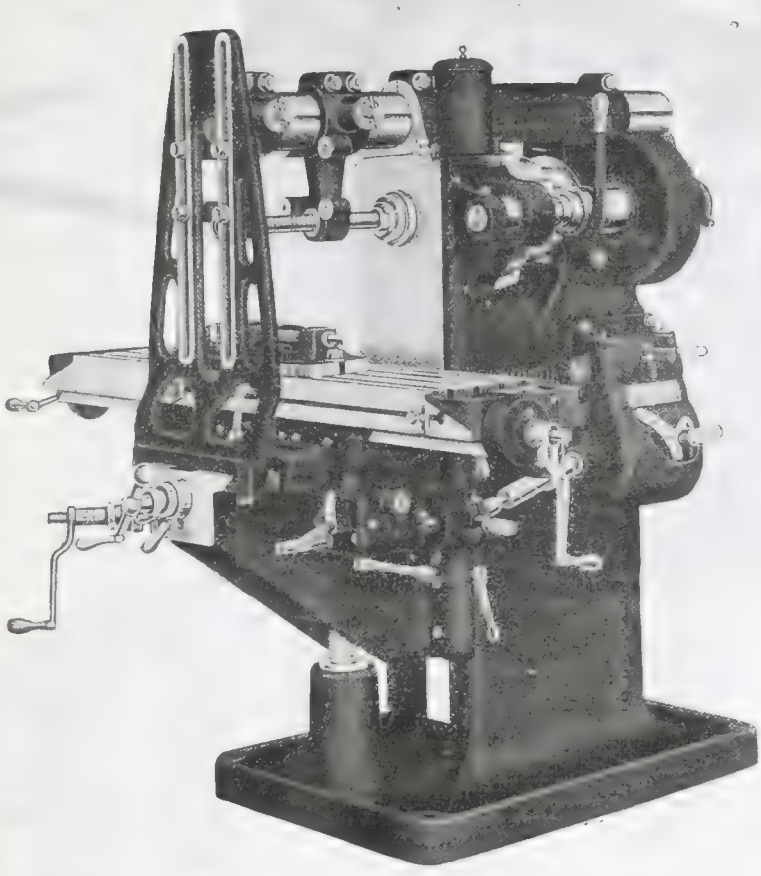
The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES: 413 St. Paul St. West, MONTREAL
79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager



LeBLOND

Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

Hardened Steel Spindle Bearings—

Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

CINCINNATI, OHIO, U.S.A.

Canadian Agents:

THE A. R. WILLIAMS MACHINERY CO., LIMITED
St. John, N.B. Montreal, P.Q. Toronto, Ont.
Winnipeg, Man. Vancouver, B.C.

THE ST. LAWRENCE WELDING COMPANY, LIMITED

MONTREAL, P.Q.

A. M. BARRY, Mgr.

Office and Works:
138-140 Inspector Street
Telephone: Office
Main 5779

Maritime Branch:
HALIFAX, N.S.

CONSULTING ENGINEERS on all kinds of welding. Breakdown repairs handled at once, just 'phone us and we will be on the job by next train.

OXY-ACETYLENE WELDING of heavy cast iron frames, cylinders, gears, water wheels, etc.

STEEL, any kind of welding on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.

Can be welded in place when necessary.

ELECTRIC WELDING on boilers, digesters, leaking tanks, etc.

MARINE REPAIRS undertaken by our Marine Welding Tug which is equipped with Electric and Oxy-Acetylene Welding Apparatus with Compressed Air Plant complete.

OXY-ACETYLENE CUTTING of any kind of steel construction.

PORTABLE WELDING APPARATUS of all kinds with trained operators always available to repair your breakdown at once.

THERMIT WELDING on all classes of work is a special feature of present activities.

Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, etc.; Electric Welders, Oxy-Acetylene Welders, Boiler Repairs, Lead Burning and Thermit Welding.

If You Need a POWER HAMMER

of uncommon strength throughout — a hammer constructed to deliver work of surpassing quality in great quantity, and to keep everlastingly at it—

You Need Jardine's

Note a few particulars:

Hammer slide is a steel casting; so is the ram, and connecting bolts for the ram are machined from solid steel bar.

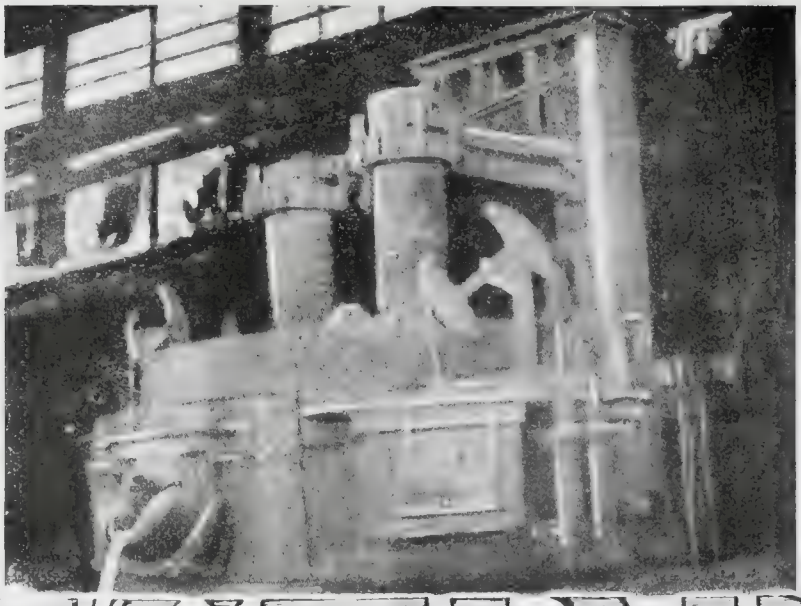
Hammer and anvil dies of properly tempered, highest grade tool steel are held in machine seats by tapered keys in the ram and anvil block, so there's no need to put taper on the dies.

Jardine's Canadian Giant Power Hammer has never failed.

Write for Catalog

A. B. JARDINE & CO.
Limited
Hespeler, Ont., Canada

If interested tear out this page and place with letters to be answered.



ELECTRITE

High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art: Electric Furnaces—entirely infallible, automatically regulated, delivering the same result time after time.

Uranium—this rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.
LATROBE, PENN.

URANIUM

STELLITE

"Not Steel, but its Master"

It has been claimed that Stellite is not suitable for finish turning shafting.

An excellent finish can be obtained and your production greatly increased if our instructions are followed. Stellite ground in the same way as tool steel will not produce results.

CONSULT OUR SERVICE DEPARTMENT

A Record of Performance

Work—Open-hearth Steel Shafting.

Machine—Shaft-turning Lathe.

Tool—2 x ⅝ x 4 inch Stellite No. 2.

Surface Speed—97 feet per min.

Depth of cut—1/32 inch.

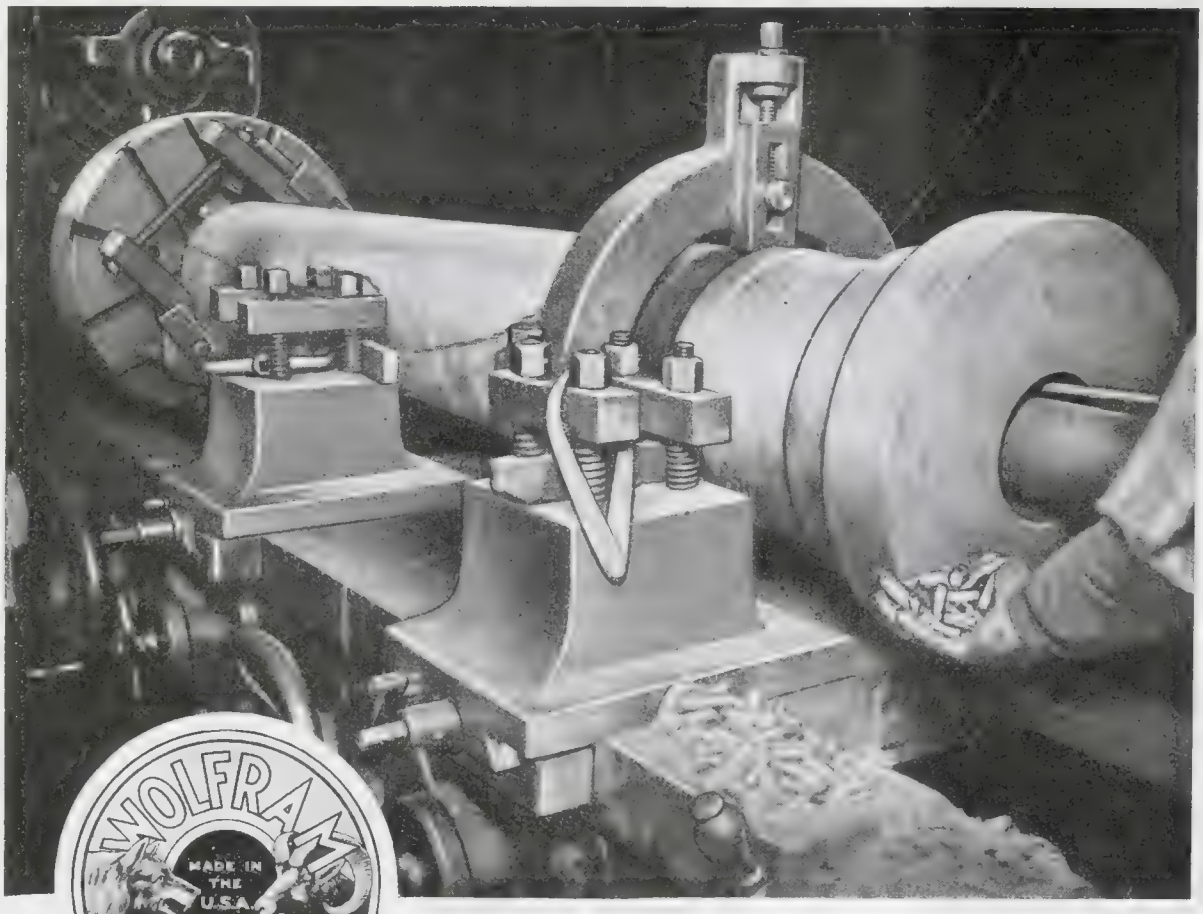
Feed—3 feet per minute.

Production—Six 30-foot shafts turned to 0.001 inch limit with one grind.

Deloro Smelting and Refining Co.
Limited
DELORO, ONTARIO

Toronto
200 King St. W.

Montreal
315 Craig St. W.



WOLFRAM

HIGH SPEED STEEL TOOLS FOR THIS JOB

"Wolfram" is the answer to your tool steel problems — and it is ready for immediate delivery.

Boring 9⅝" diam., hole 7 ft. deep in 50 Point Carbon Steel.
Tool fed in 7/32" per minute. Speed, 10 R.P.M.
Finished in 3 cuts with only 2 grindings!

Vulcan Crucible Steel Co.

ALIQUIPPA *Established 1900* PA., U. S. A.

Makers of Wolfram High Speed Steel

BRANCHES:

Boston	302 Purchase Street	Montreal	Herald Bldg.
Chicago	16-18 So. Clinton Street	Newark, N. J.	52 No. 11th Street
Detroit	310 New Telegraph Bldg.	St. Louis	1215 International Life Bldg.

CANADA
FOUNDRIES & FORGINGS
LIMITED

Producers and Distributors

TOOL HANDLES

Made from Canadian Hardwoods

Quantity Business Preferred

Special service given export inquiries

JAS. SMART PLANT
Brockville, Ont.

Swedish Steel & Importing Co., Limited

Montreal
New York
Toronto
Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK
SS
DOUBLE ESS

PROMPT SHIPMENTS from large stock

Forging Billets and Bars
Electric Furnace
Alloy Steels
Die Blocks
Annealed
Piston Rods Rough Turned
Annealed
Blue Ribbon
High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT - 823 Dime Bank Building

If any advertisement interests you, tear it out now and place with letters to be answered

WAR is destructive. Peace is constructive. War has taught us many things, chief of which is the great value of Time. Time is the essence of your life and mine. Whatever saves Time, saves Life.

"RedCut Superior"

The Nationally Known **FIRST QUALITY**

HIGH SPEED STEEL

Is the Avowed Enemy of Waste and Inefficiency, and is Allied with Life

Save Time, Save Life. Are your Tools made of RedCut?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

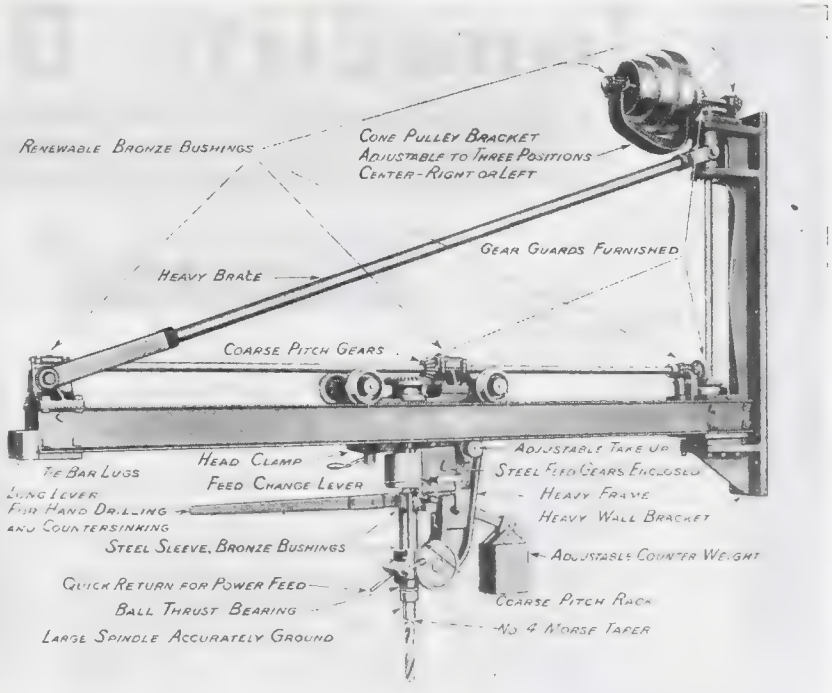
Here's a Drill You will Like

The Lynd-Farquhar Wall Radial Drilling Machine is a real machine tool, carefully designed and made from the best material. The entire control of the drill is within easy reach of the operator. The arm is constructed of extra heavy channels and is supported from the outer end of the top of the wall bracket by heavy steel brace bars. The head is exceedingly rigid. It is mounted on four flanged wheels, fitted with roller bearings, and moves with extreme ease from end to end of the arm.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.

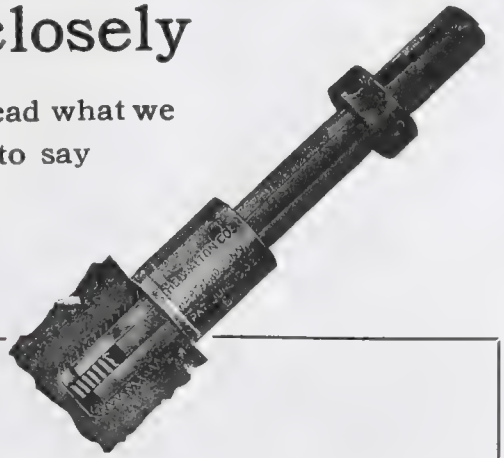


LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

Look at this again —closely

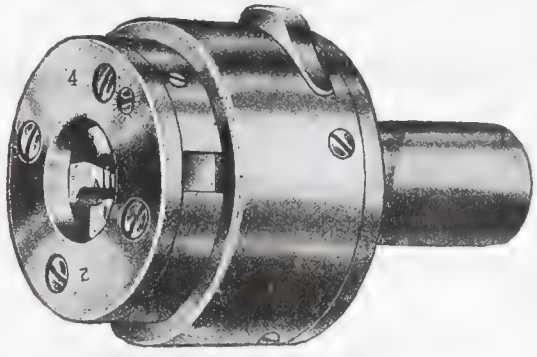
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company

Hartford, Conn.



H&G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

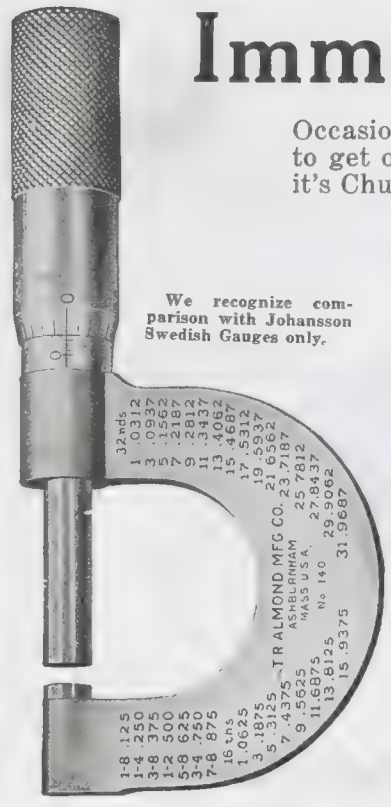
Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

If any advertisement interests you, tear it out now and place with letters to be answered.

Immediate Deliveries!

Occasions frequently arise now which make it necessary for you to get order for tools delivered to you with exceptional speed. If it's Chucks or Micrometers you require, specify—



Almond

We are in a position to fill your wants for Micrometers, Drill Chucks (all sizes) and Lathe Chucks of the smaller sizes, 5", 6", 7½" and 9".

ALMOND CHUCKS are powerful, accurate and durable and cost less to operate.

ALMOND MICROMETERS — **Recognize Comparison with Johansson Swedish Gauges Only.** Made in English measurements, 1", 2" and 3", by thousandths and ten thousandths; metric measurements 25 mm., 50-mm. and 75-mm. by 1/100-mm.

Pleased to send you full information about these quality Tools.

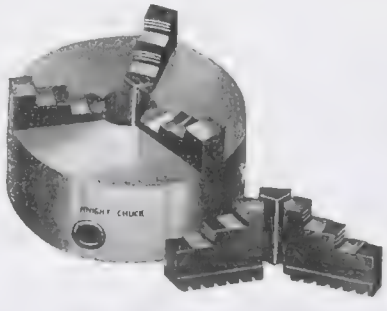
T. R. Almond Manufacturing Co. 5 MAPLE AVENUE **Ashburnham, Mass.**

"Knight" Scroll Chucks

The "Knight" Geared Scroll Chuck is substantially constructed by expert workmen, using high-grade materials, and is guaranteed to be commercially, mechanically perfect.

Sizes from 4 inch to 10½ inch.

Domestic and Export Trade Supplied.

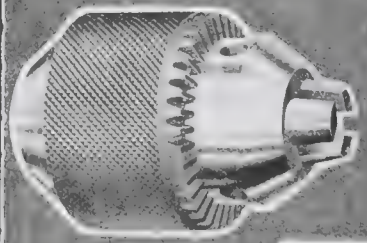


Knight Metal Products, Limited

119 Adelaide St. W. - TORONTO, ONT.

Jacobs IMPROVED DRILL CHUCK

World Famous



The secret of their success is no secret at all. Its merits these Superiority

JACOBS MFG. CO.
HARTFORD CONN.
U. S. A.

Indicating
Tycos **Controlling**
Recording

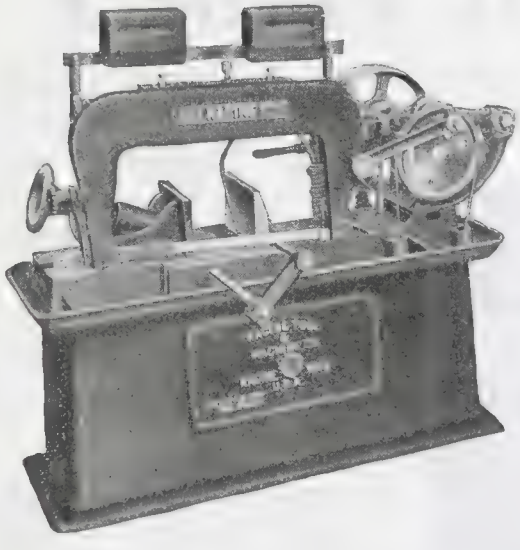
Temperature Instruments

Found in Industrial Plants where Efficiency is Paramount

An unbroken line of Temperature Indicating and Registering Instruments, from the delicate Fever Thermometer for taking body temperatures to the Fery Pyrometer, registering several thousand degrees.

Line complete and uninterrupted, embracing thermometers for every purpose into which temperature enters. We meet every application, and there are hundreds.

Correspondence Solicited.



Use "RACINE" H. S. Tungsten Power Blades

Only on the draw stroke does the blade of this

"RACINE"

High Speed Metal Cutting Machine

come in contact with the metal—then

How It Cuts---Deep and Quick

Machine is of substantial construction, designed for accuracy, for speed, for long service of both machine and blade.

The "Racine" is the only machine that duplicates every cut exactly. It has no equal for quantity of accurate work done in a day, in a year, in a lifetime.

Proof for the asking.

Standard the World Over

Racine Tool & Machine Company

Melbourne Ave., Racine, Wis., U.S.A.

One of 120

A Fuel Saver!

Bellevue Furnaces heat up rapidly and hold heat long after burners are shut off. This results in great fuel economy. In view of high cost of fuel your shop urgently needs

BELLEVUE
Heat Treating Furnaces

For heating, case-hardening and annealing. Perfected combustion precludes the formation of oxidizing elements. The flame, not visible in the muffle, does not come in contact with the material.

Scalding is practically eliminated where **Bellevue Furnaces** are in use.

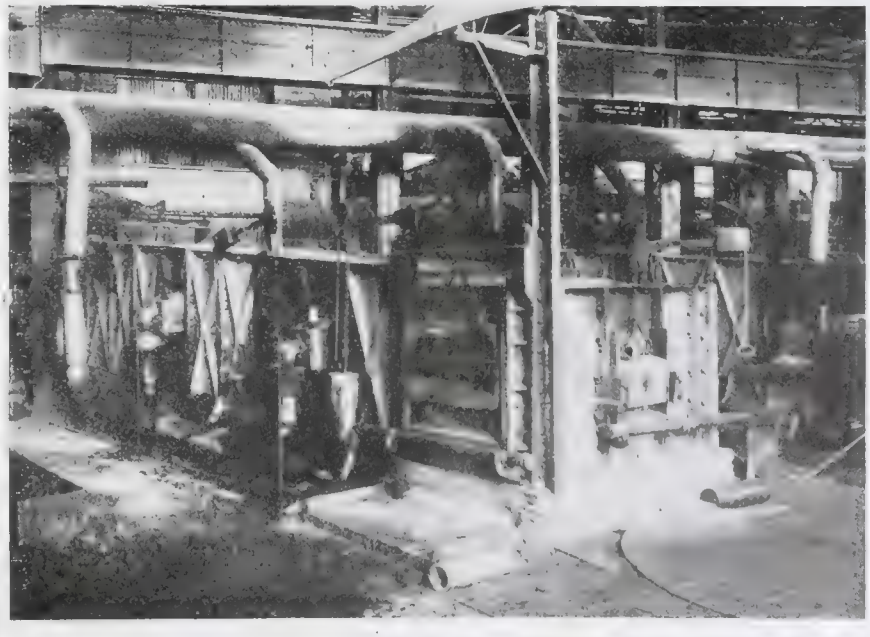
Write for catalog of full line. Enquiries promptly attended to.

Representatives in Canada:
H. W. Petrie, Limited, Toronto, Canada

Bellevue Industrial Furnace Co.
703 Bellevue Ave. - Detroit, Mich.
JULIUS C. HINZ, Pres.

Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write
Mechanical Engineering
Company, Limited
Three Rivers, Quebec, Canada

Kelly Multiple Rigid with front or rear pilots. Multiple operation tools increase output and produce perfect work.

Kelly cylinder tools are made to machine any type and size cylinder. Adjustable to keep accurate size and finish.

Kelly Floating Reamers and Bars with or without pilots for all makes of turret lathes. Sizes from 1" to 12". Each reamer has ¼" adjustment.

KELLY HIGH SPEED TOOLS FOR NEW PRODUCTION

The greatest factories in the world use Kelly Production Tools and Kelly Adjustable Floating Reamer and have increased their output—some as much 500%. Every plant has some operation that Kelly Tools can improve. Send us your blue print and let us design a tool for the job and save you time and money. All tools have adjustable high-speed steel blades.

Kelly Production Tools perform several operations at one contact with the work. Over ten years of service has shown their advantage on every variety of work such as

Engine Cylinders **Transmission Cases** **Accurate Bushings**
Gear Blanks **Auto Parts, Hubs** **Machine Parts**
Crank Cases--Cam and Crank Bearings **Connecting Rods** **Tools, Etc.**

Catalog J4, having over 100 illustrations, sent on request

THE KELLY REAMER CO.

CLEVELAND, OHIO, U.S.A.

Burton, Griffiths & Co., Ltd., London, English Agents Burton Fils, Paris, French Agents 40 Domestic Agencies

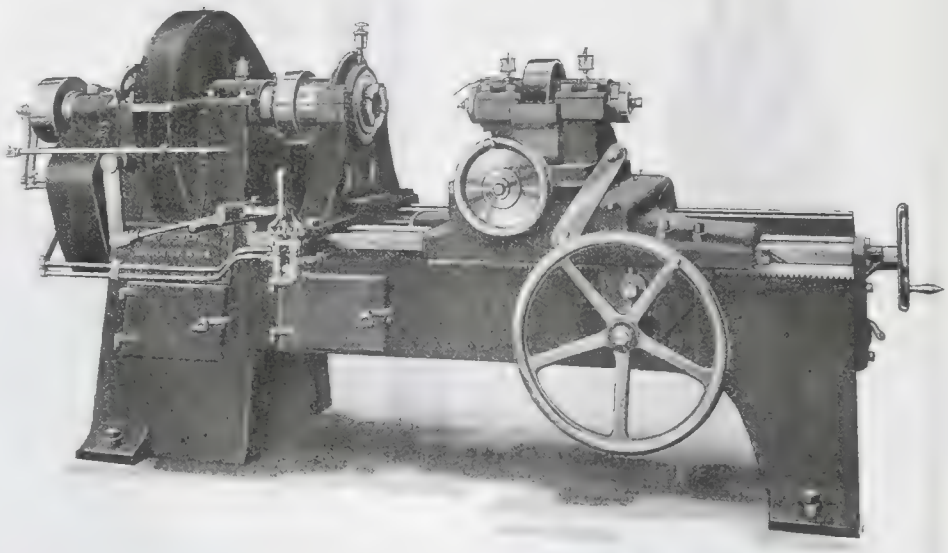
Smalley General Thread Milling Machines

Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.



Write for Bulletin.

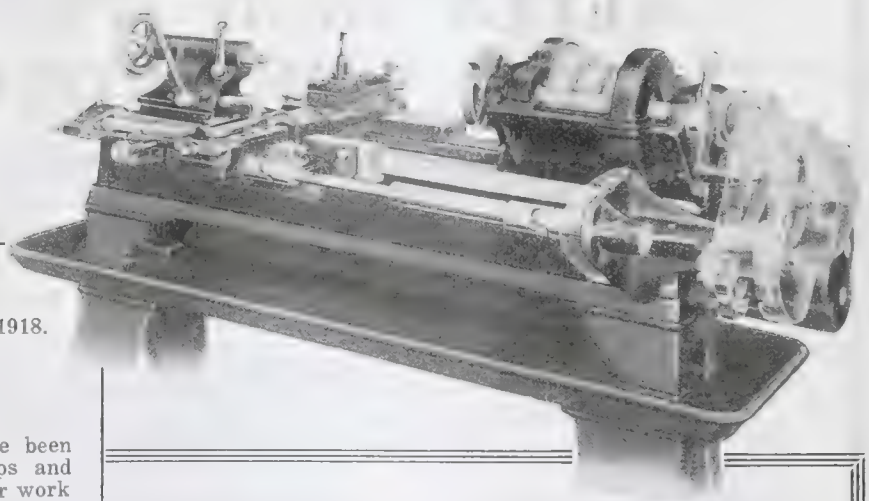
Smalley General Co., Inc.
BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

One Customer Says:

"We have the best Lathe in The City of Cleveland to-day"

READ THIS LETTER



B. & W. TOOL & DIE CO.
102 St. Clair Avenue, N.W.
Cleveland, Ohio, Nov. 19th. 1918.

Mulliner-Edlund Tool Co.,
Syracuse, N.Y.

Gentlemen:—

Since installing your 12" Lathe, we have been practically running on Thread Gauges, Taps and Dies, since the 1st of June this year. All of our work has been subject to the Bureau of Standards Inspection, we have readings in our files which are open to inspection to anybody and in any of these readings, we do not find a greater lead error than .0003 in ten to twenty threads and in many cases, absolutely nothing. Our pitchers range from 12 to 40. We consider that we have the best lathe in the City of Cleveland to-day and this statement can be verified by the local Bureau of Standards.

We desire to thank you for the very courteous service furnished us through your Mr. Bull and we feel his personal attention has been instrumental in the successful service your lathe has given us.

With best wishes, we are,
Yours truly,
B. & W. TOOL & DIE CO.
By J. A. Walton

JAW/C"

This is the Kind of ACCURACY for Your Tool Room Work

Great Strength and Rigidity, too, Characterize the

MULLINER QUICK CHANGE LATHE

The quick change mechanism gives 37 different threads and feeds. Another feature is the ring self-oiling system.
Sizes, 12-in., 14-in.; beds, 4-ft., 5-ft., 6-ft. Send for the full details of this ideal precision tool.

Mulliner-Enlund Tool Company
SYRACUSE, N.Y.

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

No Lifting or Movement of the Work

The illustration below shows the Heald 10-in. x 32-in. Flat Magnetic Chuck on planer work. It is taking a chip 5-16 in. deep with 5-32-in. feed at 60 feet per minute table speed, with no tendency to lift or move on the chuck.

HEALD MAGNETIC CHUCKS

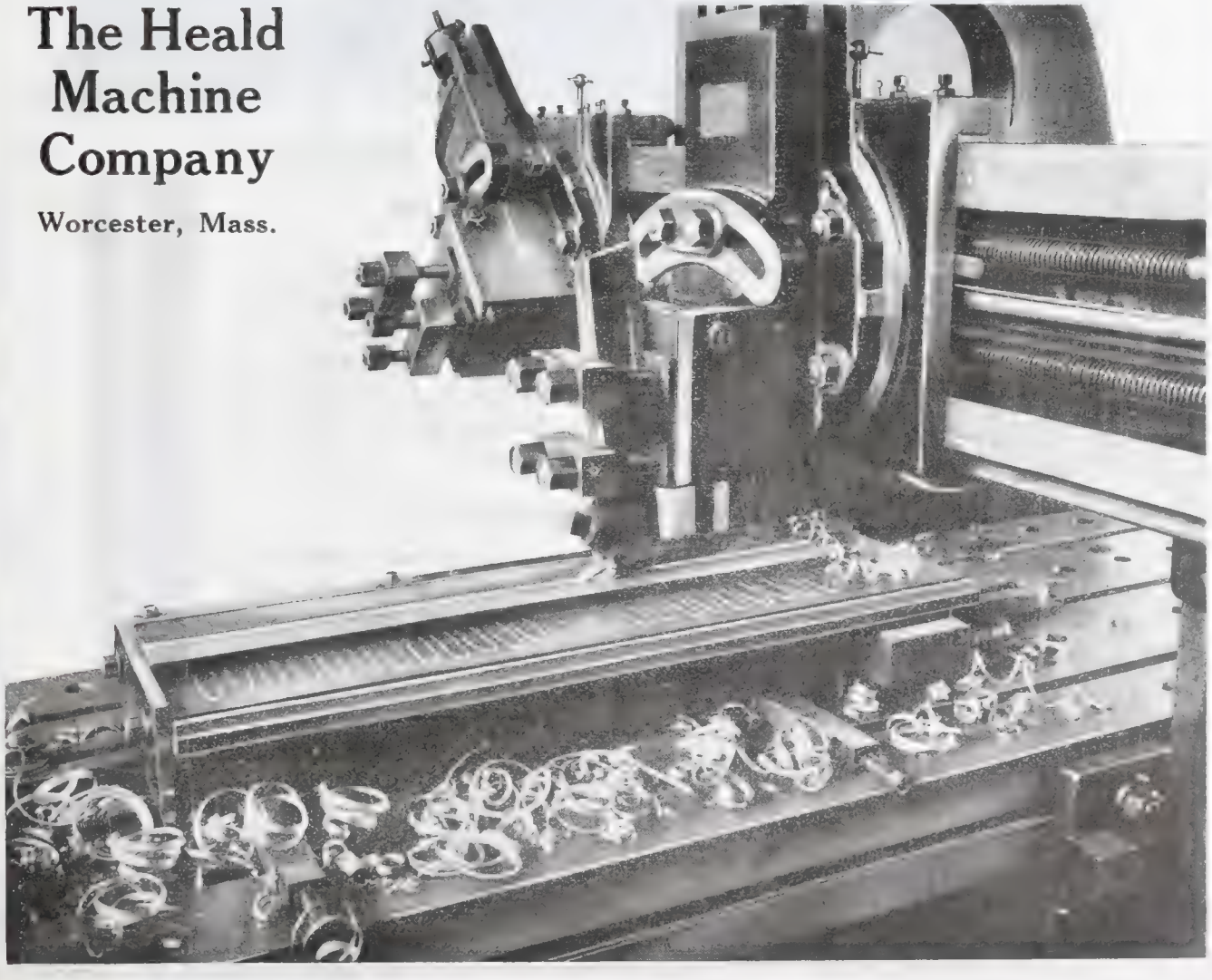
have great holding power, and consequently permit heavy cuts, coarse feeds and rapid work speeds.

All Heald standard rectangular chucks have both ends accurately machined so they can be placed end to end for holding long work. When grouped together they can be wired so as to be controlled either separately or together.

Ask your local machine dealer for bulletins and information.

The Heald Machine Company

Worcester, Mass.



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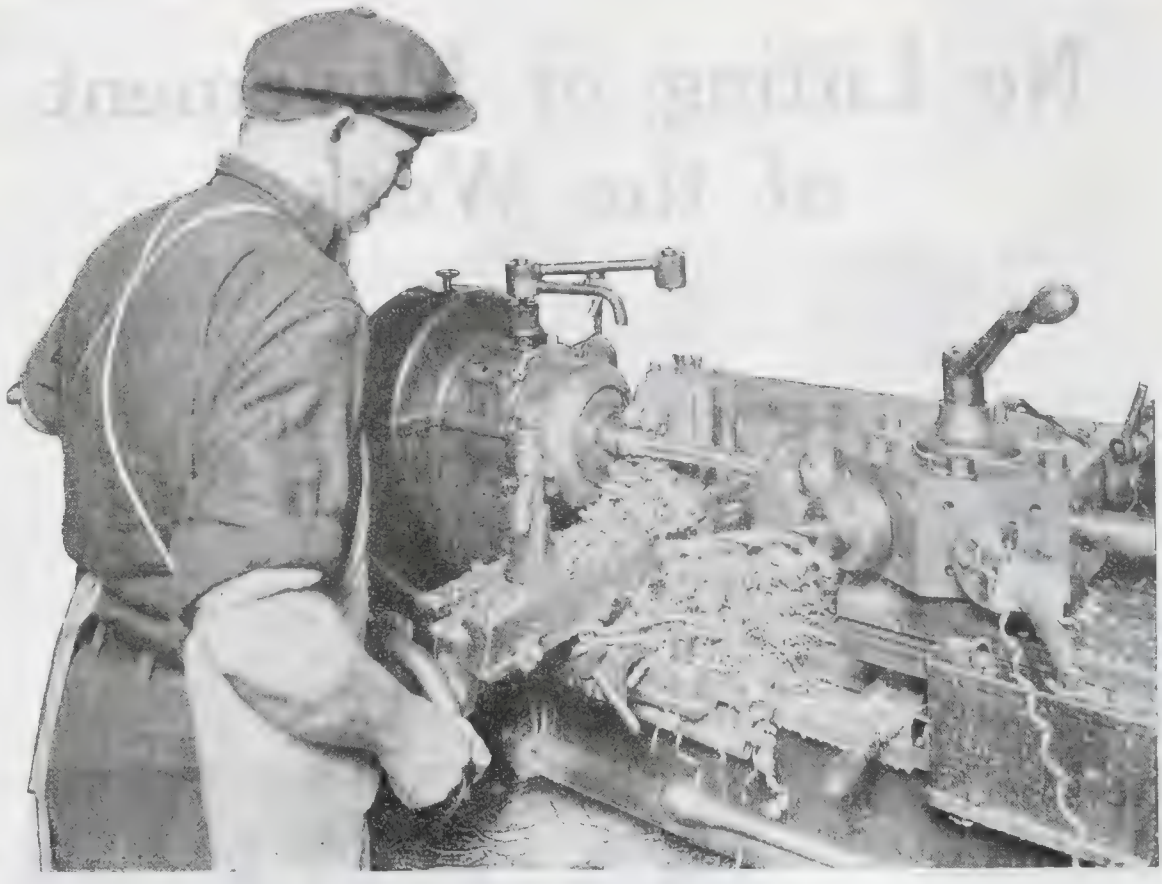
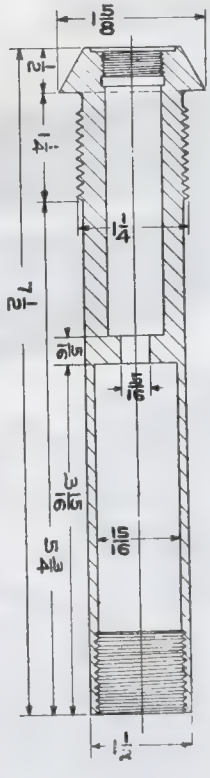




Warner & Swasey No. 6 Screw Machine

HERE is an example of forced output on a battery of 40 Warner & Swasey No. 6 Screw Machines. (This picture shows one of them) machining detonators—one every 2½ minutes, and the battery in operation day and night. The stock is 1⅞″, is drilled 15-16″ for a depth of 3 15-16″, turned all over, and cut off, ready for the second operation.

Best for Detonators

Piece work is considered best by a great many manufacturers on straight run work of this sort, especially when under penalties for delivery delays. And only the best machines can hold their accuracy under such continuous operation.

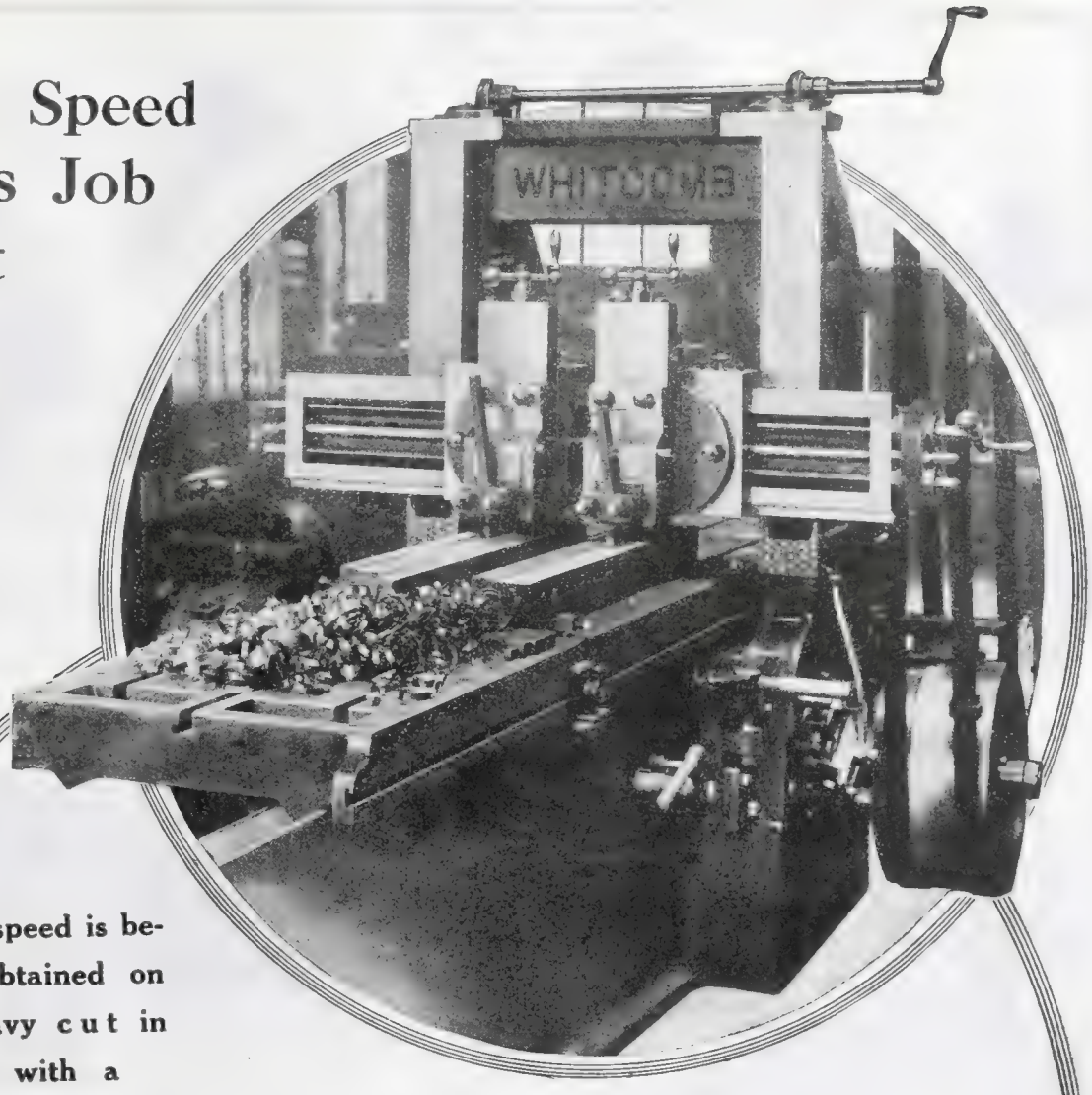
For unusual demands such as this, and for absolute certainty, in making delivery promises, specify Warner & Swasey Turret Lathes and Screw Machines.

THE WARNER & SWASEY COMPANY
CLEVELAND, OHIO

New York Office—Singer Building. **Boston Office**—Oliver Building. **Buffalo Office**—Iroquois Building.
Detroit Office—Ford Building. **Chicago Office and Show Rooms**—618-622 Washington Blvd.

FOREIGN AGENTS—Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.

Cutting Speed on This Job 70 Feet Per Minute



That speed is being obtained on a heavy cut in steel, with a

Whitcomb-Blaisdell Planer

The Planer with the Second-Belt Drive

The smooth, easy action and rapid, yet gentle, reverse required for such rapid cutting rates is secured by the distinctive table drive of the Whitcomb-Blaisdell Planer.

There are many other Whitcomb-Blaisdell Planers operating at similar high speeds in steel. In numerous cases they are planing brass, copper and other soft materials at one hundred feet per minute.

The Second-Belt Drive—using a belt and pulley to convey power from the pulley shaft to the drive-pinion shaft—eliminates the usual bull wheel and the rapid running train of gears.

On the Whitcomb-Blaisdell Planer, the table is given a smooth, quiet, yet powerful drive. At the end of the stroke the belt transmission acts with a cushion effect and the planer reverses without shock or jar, yet with the utmost speed.

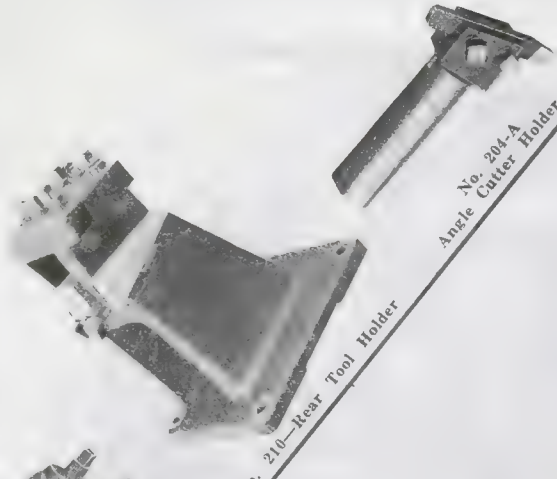
That is one reason why this machine attains the highest speeds without impairing the accuracy or finish of the work.

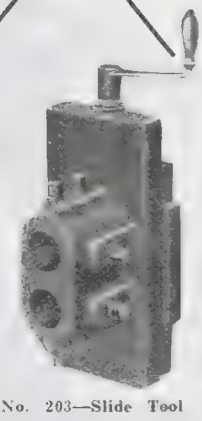
Write for Illustrated Catalog that tells all about it.
The big features of this machine will be of interest.

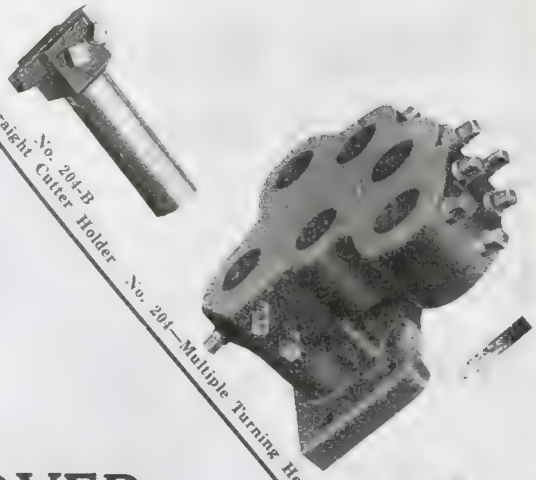
WHITCOMB - BLAISDELL
MACHINE TOOL CO.
WORCESTER, MASS., U.S.A.

LATHES PLANERS

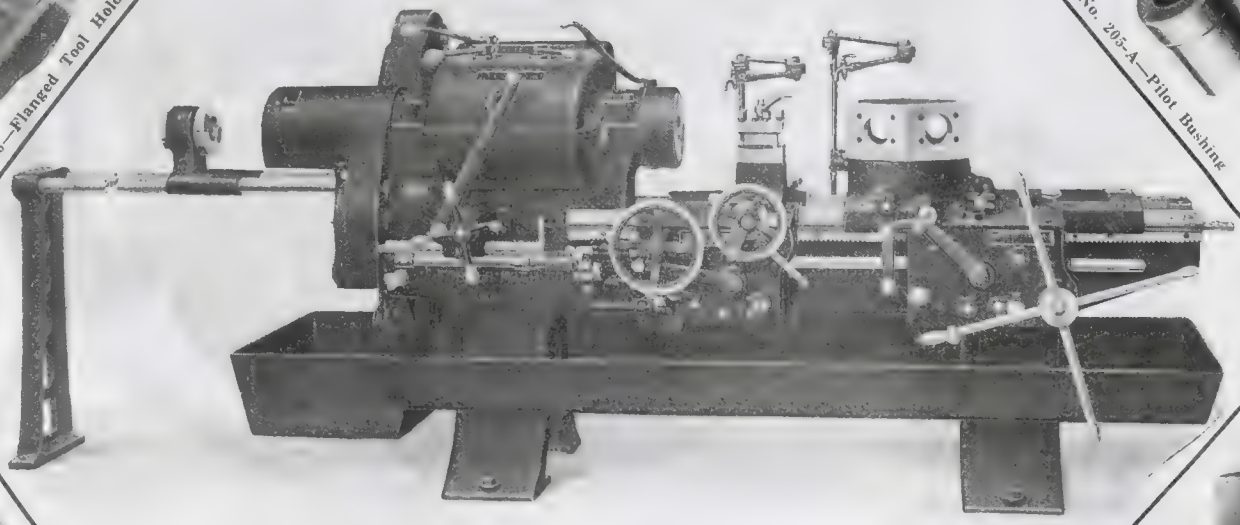
If any advertisement interests you, tear it out now and place with letters to be answered.







THE WAR IS OVER



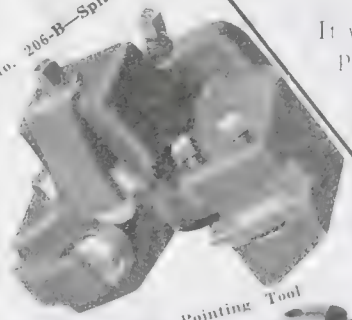
2-B UNIVERSAL TURRET LATHE

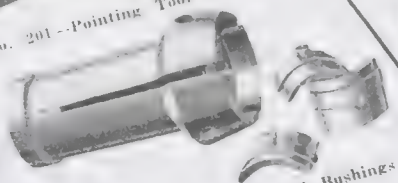
THE TIME OF KEEN COMPETITION IS HERE

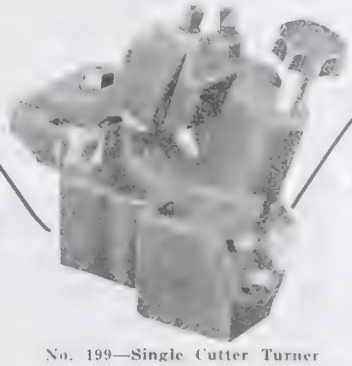
It will, therefore, become increasingly necessary to watch your production costs.

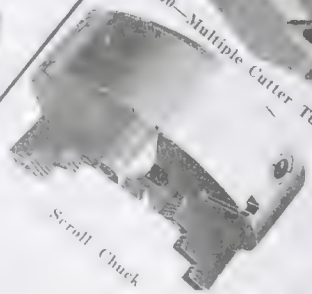
The Foster 2-B Universal Turret Lathe, equipped with Foster Tools, will bring your production costs down to a minimum.

Our catalogue ought to be in your file. Write for it.









Foster Machine Company, Elkhart, Indiana, U.S.A.

They're a mighty nice bunch to deal with

THE CLEVELAND TWIST DRILL CO. · CLEVELAND · NEW YORK · CHICAGO

Agents for Europe
CLEVELAND TWIST DRILL CO., (GREAT BRITAIN) Ltd.
88-97 Upper Thames St, London E. C. 4.

If any advertisement interests you, tear it out now and place with letters to be answered.

90-inches in diameter

Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1" plate, 1 5/16" kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.

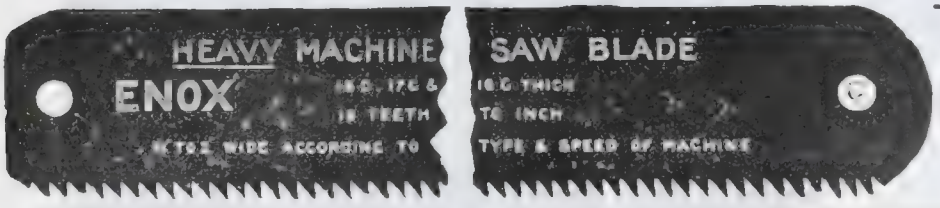
Hunter Duplex Saws

No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties. Write for prices.

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.

SIMONDS
HACK SAW BLADES
UNEQUALED IN QUALITY ANY SIZE OR LENGTH
Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER

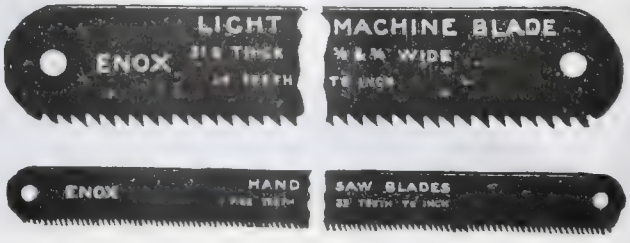


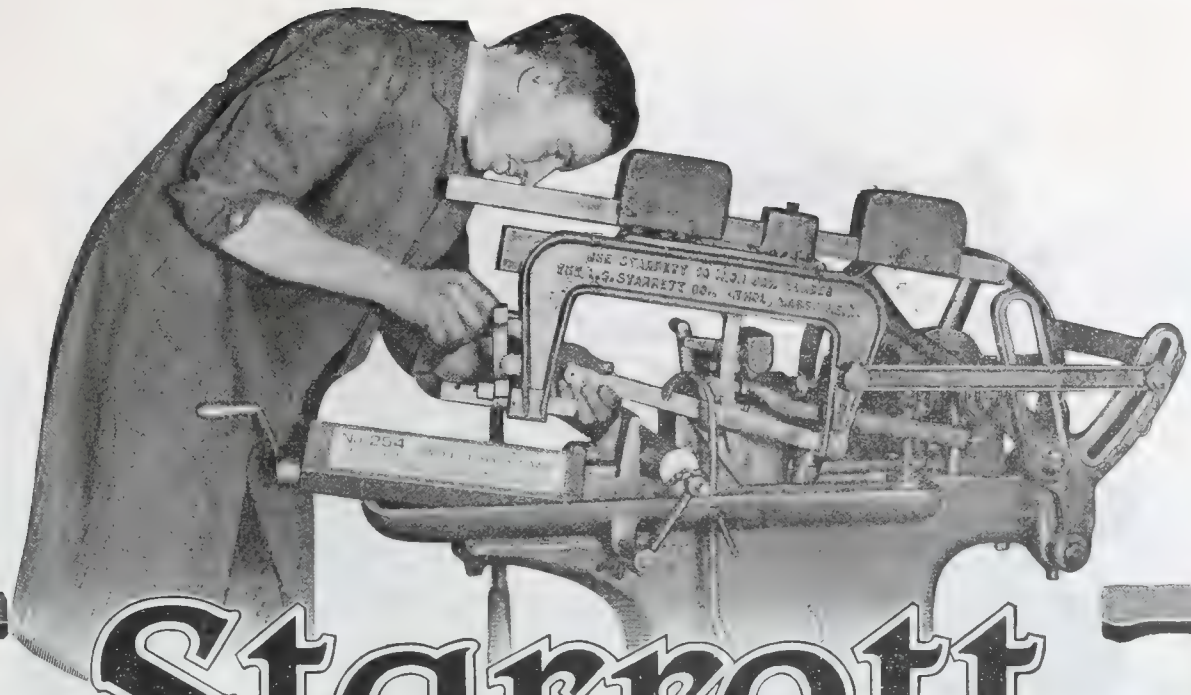
ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:
FRY'S (LONDON) LIMITED
AN ENTIRELY BRITISH COMPANY
46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10





Starrett Hack Saws

have the Stamina, the "Punch," and the Endurance. They are made of the **right stuff**—the finest tempered Tungsten steel, with milled teeth properly set; flexible or hard backs, so they can take a lot of punishment and abuse without calling "halt" or breaking down.

Mechanics, superintendents, and "bosses" endorse and recommend Starrett Hack Saws as the truly economical saws, because they give the maximum of service for the minimum of cost.

Write for Catalog No. 213. It shows many styles and sizes of fine precision tools and also hack saws.

The L. S. Starrett Co.

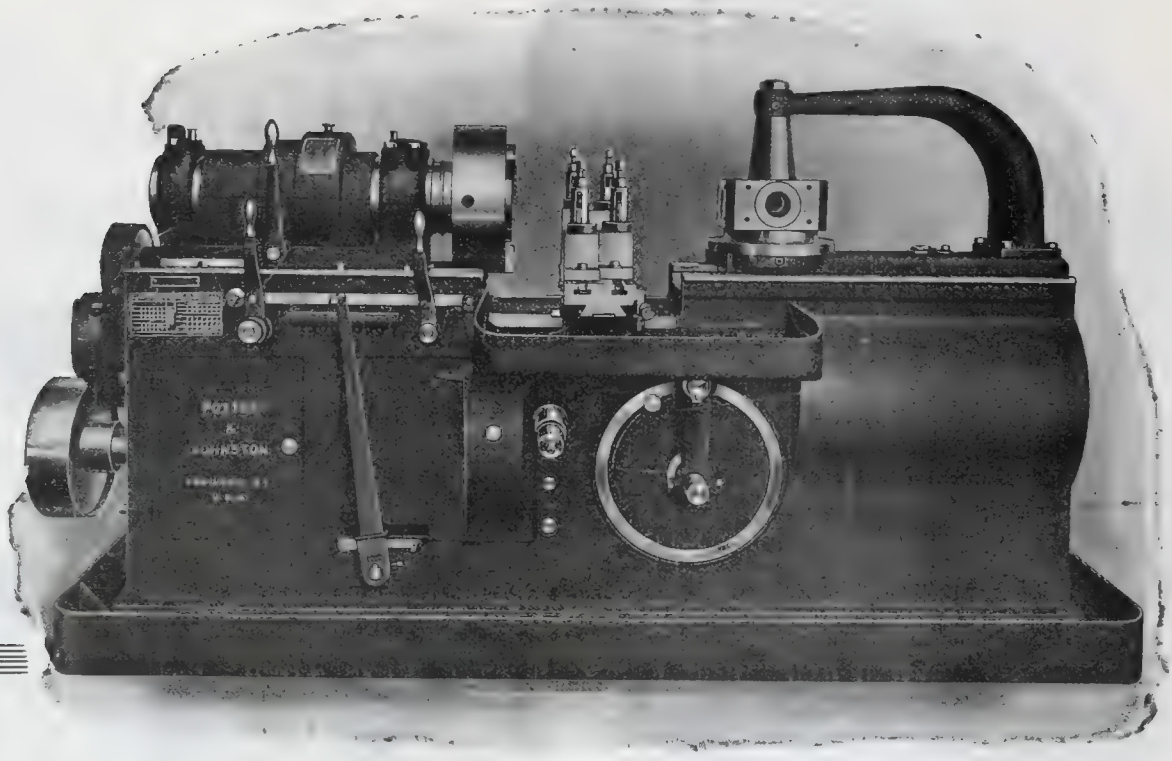
The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled

ATHOL, MASS.

42-869

STARRETT HACK SAWS CUT QUICKER LAST LONGER

If any advertisement interests you, tear it out now and place with letters to be answered.



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost, *both* are readily obtained on

Potter & Johnston Manufacturing Automatics

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

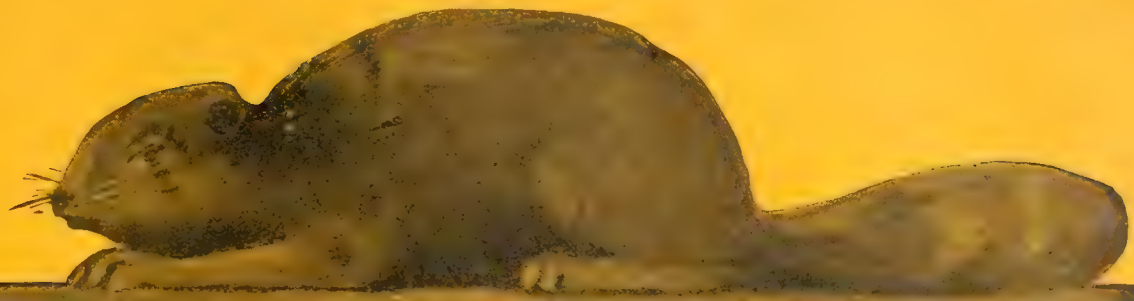
In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

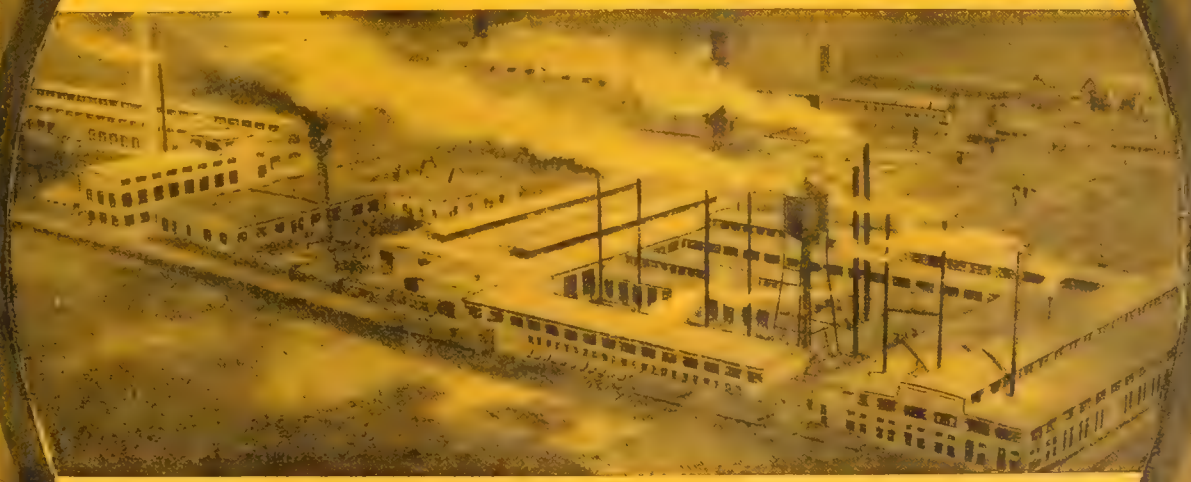
Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada



BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.



Seamless Brass and Copper Tubes.
Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

MADE IN CANADA

Malleable and Cast Iron
PIPE FITTINGS

Both Screwed or Flanged,
Black or Galvanized—All Sizes

MALLEABLE AND
GREY IRON
CASTINGS

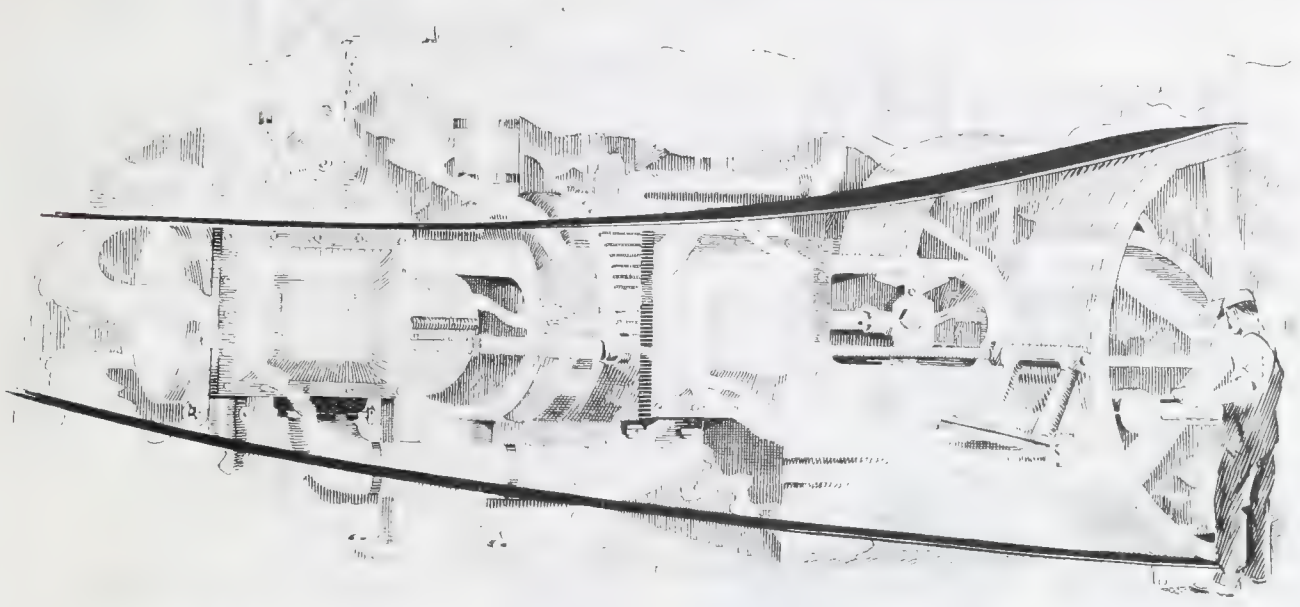
For General Machine Shop Work, for Manufacturers of Automobiles and Specialty Manufacturers.

Quality Products

We have the facilities for filling your orders with exceptional promptness. Annual capacity 6,000 tons.

Prompt Service

International Malleable Iron Co., Limited
Guelph, Ontario



Good Belting Service in Hard Places

IMPROVED service and lower belting costs have come wherever Goodyear Extra Power Belting has been installed in hard places—on drives exposed to the heat of furnaces, the live steam of engine rooms, the variable atmosphere around a lumber mill, or the outdoor conditions of a thresher outfit.

In the Wallaceburg plant of the Dominion Sugar Company, for example, there is a Goodyear Extra Power Belt that has won for itself an unusual record—and firm friends.

For it has solved a difficult belting problem. It has overcome conditions under which other belts and other types of belting have failed completely. Even under normal conditions the service this belt has yielded would be welcomed in many plants to-day.

Read the brief statement given us by Mr. F. W. Gonyan, their Chief Engineer:

"This belt is 46 ft. 4 in. of 7 in. x 8 ply Extra Power and runs on Screw Conveyor Drive. Load variable. *Belt always exposed to live steam.* A special. . . wouldn't start the drive; another type of belting lasted one week; . . . unsatisfactory——

——Extra Power has run *one year* and has *never been touched.*"

Similar testimonials have come to us from every province in Canada, proving that such trouble-free service is not exceptional—that on exposed drives such as this, Goodyear Extra Power Belting is winning a Dominion-wide reputation.

For example, duplicating the above statement of Engineer Gonyan, we have received the following from E. C. Farber, of the Beaver River Lumber Co., County Line, B. C.

"The conveyor belt runs direct from a small engine to the conveyor drive and is a six-inch, six-ply Extra Power Belt. *It is subject to steam and heat in the engine room and to cold and dampness on the outside.* Although it has been in use for a period of *five months* now under these conditions, there is no sign of deterioration and there is *no slippage.*"

Backing up these two testimonials comes this verdict from J. Mahhon & Sons, Calgary, who use Goodyear Extra Power on their threshing outfit: "Your Extra Power Belt is as good now as when the season commenced, and we had the hardest threshing we have had as long as we have been threshing."

* * *

Belting that gives good service and lower costs under abnormal atmospheric conditions is surely a better belt for all ordinary drives. The Goodyear Belting man has a big story to tell you. He's a man trained to discuss belting problems. Perhaps he may help you. His service or ours involves no obligation. Phone or write the nearest branch.

The Goodyear Tire & Rubber Co. of Canada, Limited

Branches Halifax, St. John, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver.

Service Stocks in Smaller Cities

GOODYEAR

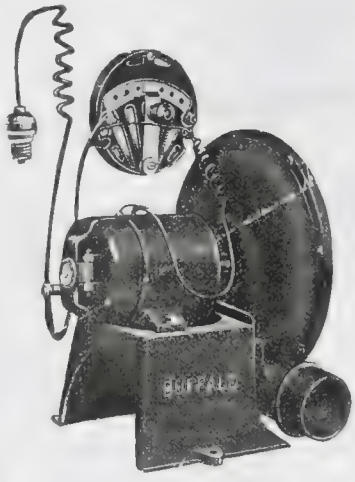
MADE IN CANADA

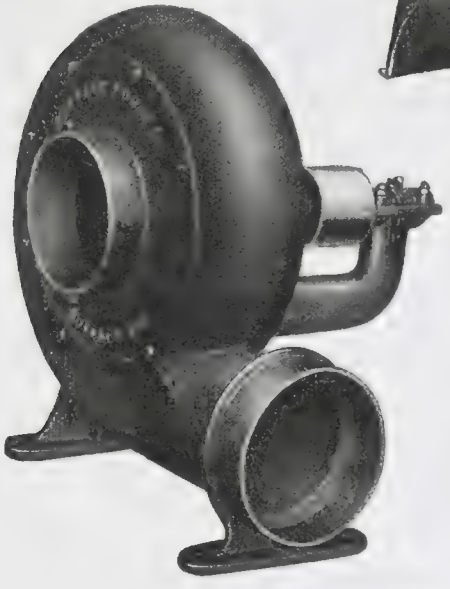
EXTRA POWER BELTING

Canadian

Fans, Blowers and Pumps for Acid Service

This direct-connected little blower is one of the handiest ever made for blowing forge fires, exhausting gases and fumes, dust from small grinders and buffing machines, blowing scale for power hammers and chips and sawdust from woodworking machinery.





"Buffalo" Acid Fans, Blowers and Pumps can be built of any metal or alloy that is most suitable for the special work demanded of them — cast iron, lead, bronze, monel metal, copper, tin, aluminum, etc.

Our long experience in building acid fans, blowers and pumps enables us to build the type of equipment best suited to meet YOUR requirements.

Consult us before buying. Our engineering department will be glad to give you complete information. Write to Department 16.

Canadian Blower & Forge Co., Limited

Kitchener, Ont.

P H

TRADE MARK

WHY P.H. and IMPERIAL FILES?

Because they are made of the best file steel in America. All sizes and shapes are made of Best Crucible Cast Steel exclusively.

Because they are processed entirely by the most expert workmen in this highly specialized trade.

Because they are made in Canada by Canadian Capital and Canadian Labor.

and

Because

"They Cut Faster and Wear Longer."

Port Hope File Mfg. Co.

LIMITED

PORT HOPE - - ONTARIO

"ASK YOUR JOBBER"

IMPERIAL

TRADE MARK

Forgings and Steel Stampings

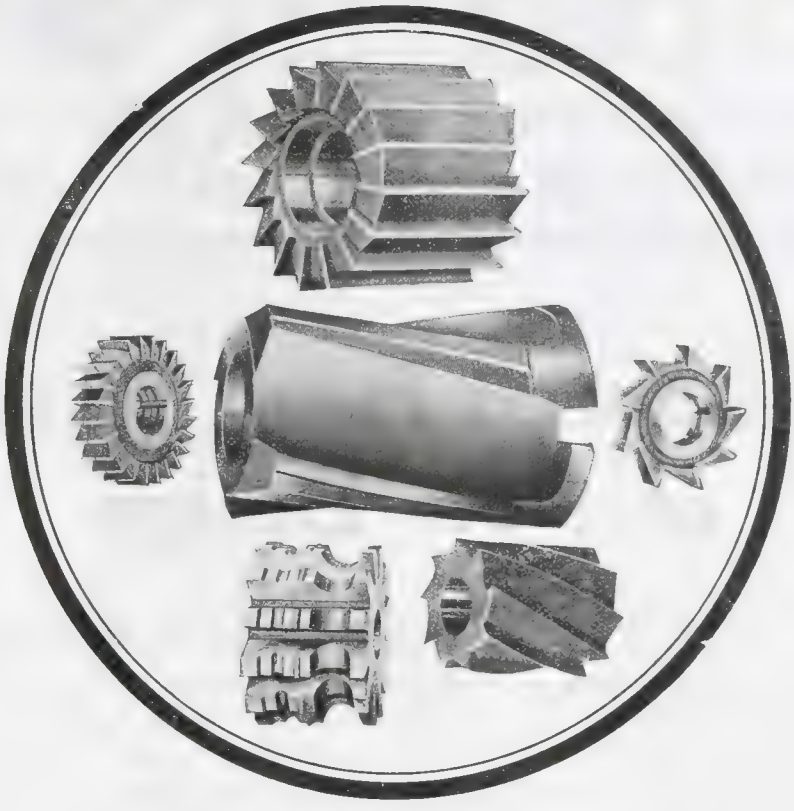
OUR Forge Plant compares very favorably in size with any on the Continent. Its efficiency is equal to that of any, and exceeds most. We can handle effectively practically any drop forging.

OUR Stamping Plants contain over 100 presses, including equipment to handle heaviest drawn work.

Dominion Forge & Stamping Co., Ltd.

WALKERVILLE, ONTARIO

Toronto Office: 510 Lumsden Building



DAVIDSONIZED
HIGH SPEED STEEL TOOLS

such as pictured above, are establishing new standards in high speed tool efficiency. Made by the Davidson process, these tools possess a degree of toughness, cutting efficiency and resistance to abrasion such as was never before believed possible. Actual working tests have always proven 50% or greater increase in production.

SPECIAL SERVICE

To plants having their own tool making force we supply these tools in rough ground annealed form within approximately 1-32 of finish. Thus a tool that takes 20 hours to make from the solid bar can easily be finished from our blanks in 2 hours. This standard of comparison holds good as regards various styles and sizes of tools. The use of our tools in this form will establish new standards in tool room production. We guarantee against breakage in the hardening operation.

Send Drawings, Blueprints or Patterns and we will quote prices and quick deliveries.

DAVIDSONIZED D T M CORP STEEL

The Davidson Tool Mfg. Corporation

Main Offices:
118-120-122-124 Maiden Lane
New York City

Works:
56-58-60-62 North Sixth Street
Brooklyn, N.Y.

SOLE SELLING AGENTS FOR CANADA:

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Ottawa Toronto Winnipeg Hamilton Saskatoon St. John Calgary Quebec Vancouver Montreal Victoria Windsor

If any advertisement interests you, tear it out now and place with letters to be answered.

REED-PRENTICE COMPANY

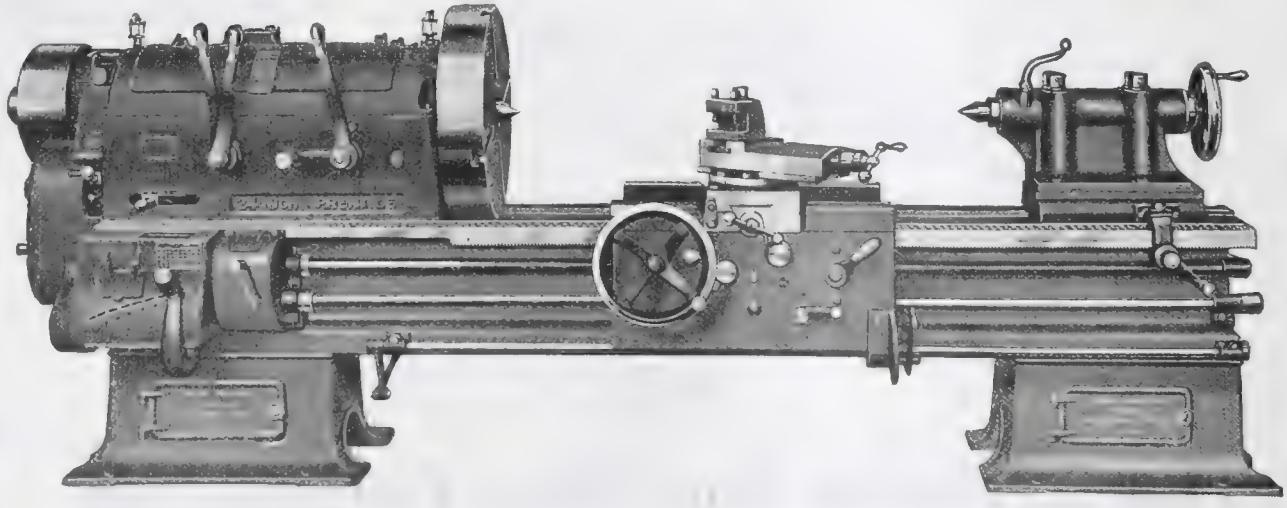
WORCESTER MASS. U.S.A.

A 24" Geared Head "Prentice" of New Design

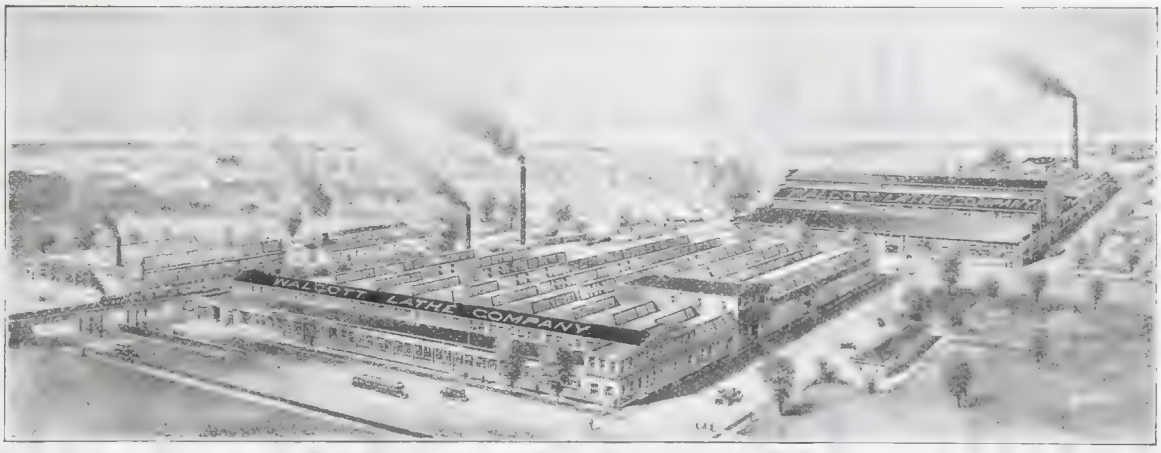
All 12-spindle speeds are obtained through gears and quick-acting clutches which are operated by the levers on the head.

All speed, feed and screw-cutting changes can be made so rapidly that, in the course of every day manufacture, the operator can give you maximum production in record time.

Although of quite a large swing, this lathe can be used profitably on small work. Its versatility, ability and convenience will be a continual source of income to you.



MANNING, MAXWELL & MOORE, INC
FENWICK FRERES
CANADIAN FAIRBANKS-MORSE CO., LTD



THE NEW HOME OF THE WALCOTT—Established 38 Years.

Consider These Walcott Facts
When Contemplating a Lathe Purchase

The Walcott organization is headed by men of recognized ability whose business acumen and methods of square dealing is manifest in the product they build. The fact that the Walcott plant has grown from a small tinkering shop to one of the largest in the world, making Lathes exclusively is evidence of the responsibility of the makers and the quality of the product. Walcott Lathes have many mechanical virtues Descriptive catalogue sent by request.

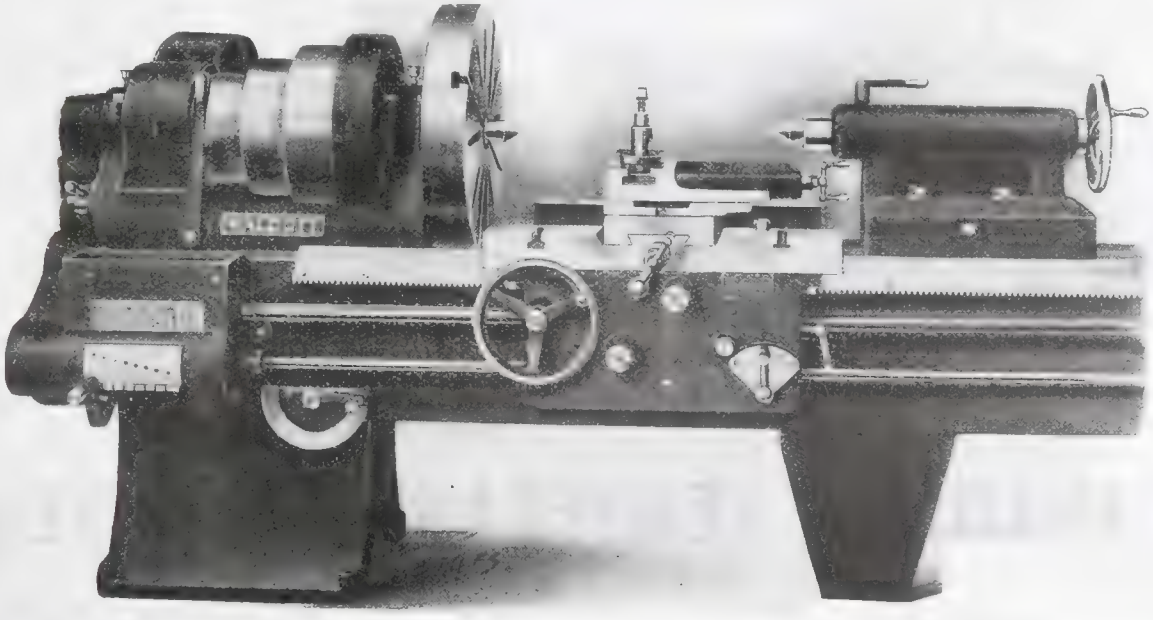
WALCOTT LATHE COMPANY

DOMESTIC AGENTS:

Hill, Clarke & Co., Chicago, Ill.
Frevert Machy. Co., New York City, N.Y.
W. E. Shipley Machy. Co., Philadelphia, Pa.
National Supply Co., Toledo, Ohio.
Motch & Merryweather Machy. Co., Cleveland, Ohio and Pittsburgh, Penna.
H. A. Smith Machy. Co., Syracuse, N.Y.
William E. Duff, York, Penna. and Jacksonville, Fla.
P. H. Reardon, San Francisco, Calif.
Brown-McDonald Machy. Co., St. Louis, Missouri.
Smith-Booth-Usher Co., Los Angeles, Cal.
Factory & Mill Supply Co., Boston, Mass.
Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.
Gordon & Finkbeiner, Portland, Oregon
Northern Machy. Co., Minneapolis, Minn
Brownell Machy. Co., Providence, R.I.
Chas. A. Strelinger Co., Detroit, Mich.
Marshall & Huschart Machy. Co., Indianapolis, Ind.

FOREIGN AGENTS:

Ricardo Grissi, Milan, Italy.
Fenwick, Freres & Co., Paris, France, and Rio de Janeiro, Brazil.
Buck & Hickman, Ltd., London, England.
Alfred Herbert, Ltd., Coventry, England
Standard Machy. & Supplies, Ltd., Montreal, Quebec.
William E. Duff, Tokyo, Japan.
Canadian Fairbanks-Morse Co., Toronto, Ontario, and Vancouver, B.C.



We Have Received Instructions to Dispose of Our

$2,000,000 Stock of High Grade Materials

Purchased for the Manufacture of Aeroplanes, and the Following is

OFFERED SUBJECT TO PRIOR SALE

ALUMINUM SHEETS

HARD DRAWN PIANO WIRE

NICKEL STEEL BOLTS AND NUTS

COPPER AND BRASS NAILS AND RIVETS

STEEL BARS 20-30 CARBON

BRASS AND COPPER SHEETS AND TUBING

SEAMLESS AND WELDED IRON TUBING

COLD DRAWN 3½% NICKEL STEEL BARS

CAST AND MACHINERY STEEL AND COLD ROLLED STEEL

HOT AND COLD ROLLED SHEET STEEL

SHAFTING, HANGERS, BEARINGS, COUPLINGS, ETC.

EXTRA FLEXIBLE AIRCRAFT CORD

GASOLINE AND WATER HOSE

PAINTS, OILS, VARNISHES, ENAMELS

VENEER

TERNEPLATE

RUBBER MATTING

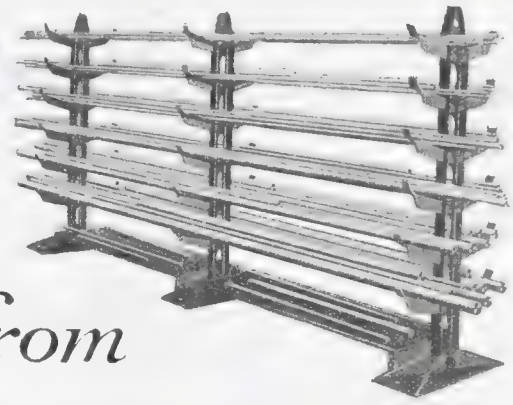
TOOL ROOM, MACHINE SHOP AND WOODWORKING MACHINES

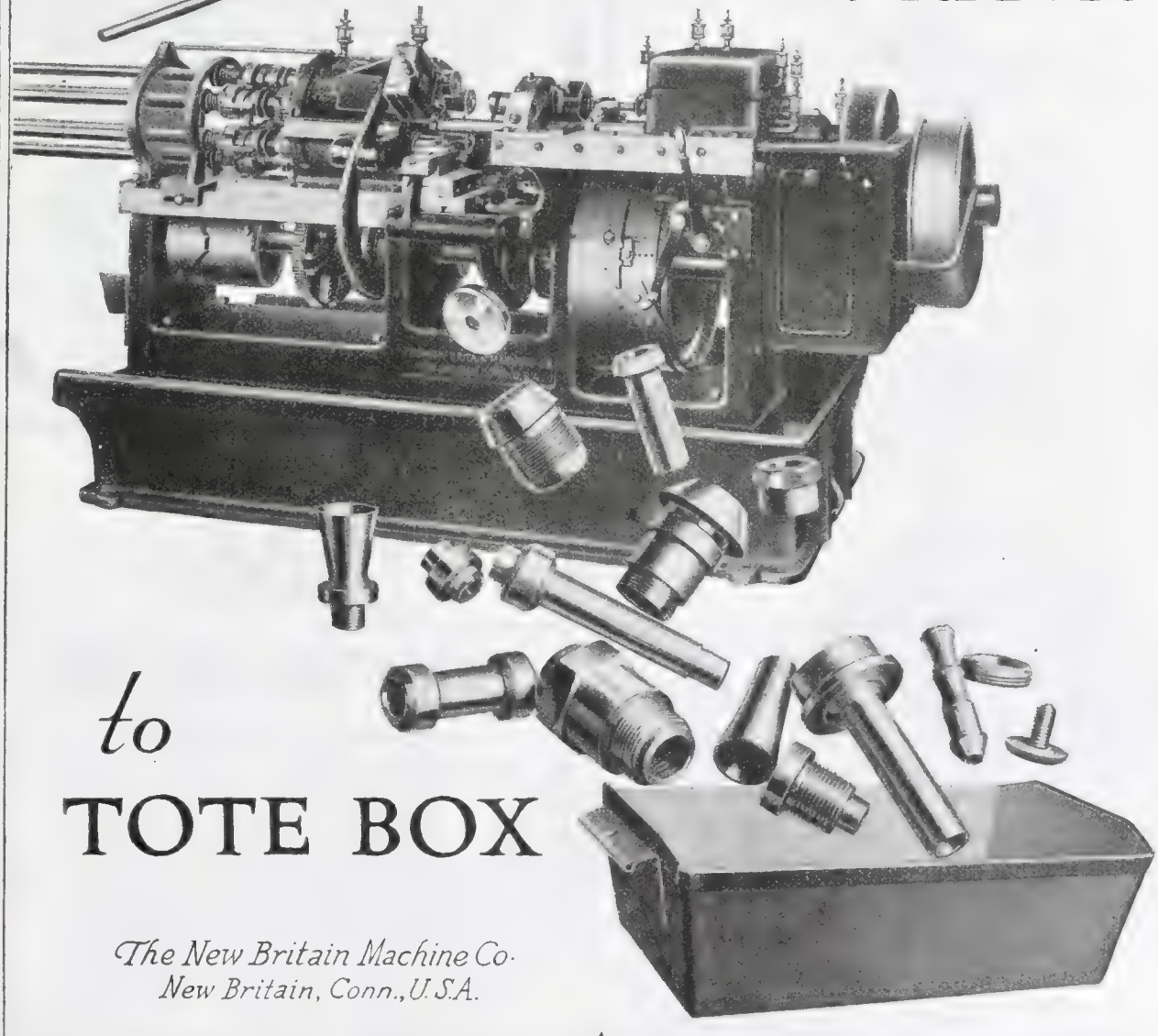
Send Us Your Inquiries and We Will Quote You Attractive Prices

CANADIAN AEROPLANES, LIMITED

TORONTO

The SHORTEST ROUTE from STOCK RACK to TOTE BOX





The New Britain Machine Co.
New Britain, Conn., U.S.A.

NEW BRITAIN
SIX-SPINDLE AUTOMATICS

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 16A

TRIAL WHEEL TAGS

When wheels are sent out for trial for experimental purposes, they are tagged with a large blue tag 10½" long. The reason for this is that the wheel may be identified from others; that information may be given on the tag as to what operation it is intended for; that the operator or foreman may record a report on the action of the wheel, and the operator or foreman will have a satisfactory record for himself if he will fill in and retain the detachable end of the tag.

KEEP THIS TAG WITH WHEEL UNTIL USED

GRINDING NORTON WHEELS

Alundum

TRIAL WHEEL

RECORD TAG

Please return this tag to Salesman or to us direct when reporting on trial or duplicating order.

Norton No. 911051 Customer's No.

Size 10 x 3/8 x 3

Grain 80 Grade N Face

Tested at 3450 Rev.

Speed recommended - R.P.M. 1910 to 2290

Speed within above range is dependent on condition of machine, method of grinding and safety appliances used.

For grinding Rolls ½" dia. 3" long.. 70 pt. carbon - Firth - Sterling Steel - Open fire hardened

(Please record results by either putting a circle around words or entering figures when required)

Satisfactory (Yes) No

Life: Days Hours

Production: Pieces Per Hour / Total Pieces

Dressing Once a day Pieces Per Dressing / Total Dressings

Cut: (Fast) Slow Coarse Fine Hard Soft Loads Glazes

Remarks Wheel wear about .00025" to every .050" stock removed

Record of Previous Wheel Used:-

Grain 46 Grade L Abrasive Lit. Alun

Life: Days Hours / Total Dressings

Cut: Fast Slow Coarse Fine (Soft) Hard Loads Glazes

SEE OTHER SIDE

The accompanying tag gives the information required and tells in just what respect the wheel was satisfactory or unsatisfactory.

There are many such good tags that come back, but there are a great many that do not contain all of the information that is desirable and consequently those customers who are negligent in this respect cannot expect to get 100% efficient service from the grinding wheel manufacturer whose one thought is to ship the wheel that will produce the best all-round results.

NORTON COMPANY

NEW YORK STORE 151 CHAMBERS ST. CHICAGO STORE 11 NO. JEFFERSON ST.

ELECTRIC FURNACE PLANTS

NIAGARA FALLS, N.Y. CHIPPAWA, ONT.

Canadian Agents:—The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS NIAGARA FALLS, N.Y. CHIPPAWA ONT. NEW YORK STORE 151 CHAMBERS ST CHICAGO STORE 11 NO JEFFERSON ST

TRADE NORTON MARK

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

Canadian Fairbanks-Morse Co., Ltd.

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

Jas. H. Matthews & Co. - Pittsburgh, Pa.

Steel Lettering Dies and Stamps

Reg. U.S. Pat. Office.

"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

Metalwood Manufacturing Co.

Detroit, Michigan

Sales Representatives

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto; R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago; Fairbanks-Morse & Co., Inc., 30 Church St., New York City; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

Precision in Threading

GTD

Precision in threading can be attained only by the use of precision tools.

The "Gun" Tap

The "Gun" Tap holds all records for accuracy, speed and durability. Its shearing cut requires a minimum of driving power and is self-cleaning—it shoots the chips ahead.

The "Gun" Tap maintains its size and lead in any material.

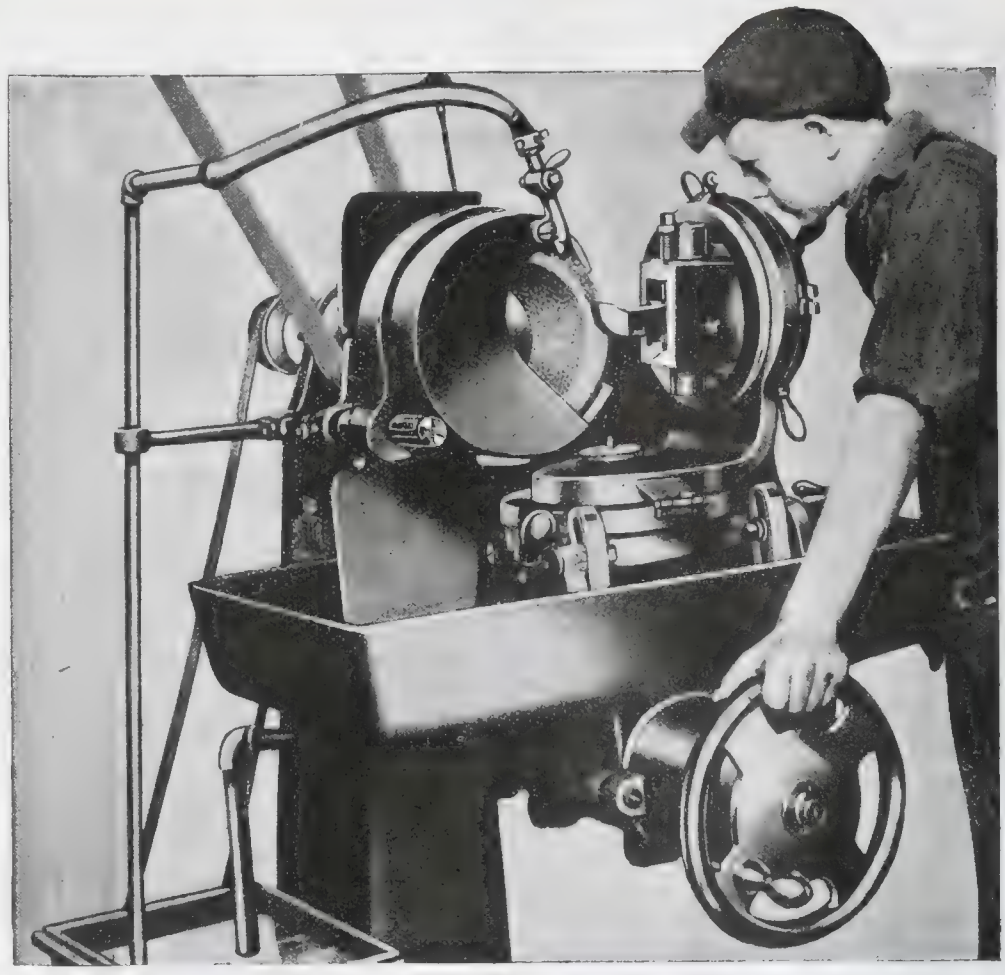
The Acorn Die

The Acorn Die is capable of a minute adjustment, holds its lead with accuracy, is absolutely rigid while cutting and will outwear a number of ordinary dies.

Nicely illustrated booklets describing the "Gun" Tap and the Acorn Die will be sent on request. Also new No. 40 Small Tools Catalog.

Wells Brothers Company
of Canada, Limited
GALT, ONTARIO
Canadian factory of the
Greenfield Tap and Die Corporation

98



The More Varied the Tools The More Profitable is the

GISHOLT TOOL GRINDER

The greater the variety of tools and number of angles to grind the more apparent are the speed and accuracy of the Gisholt Tool Grinder. A boy can grind more tools with this grinder, and with less effort, than a skilled mechanic can grind by hand. He will duplicate angles perfectly. He'll jump from one tool to the next without waste effort or loss of time.

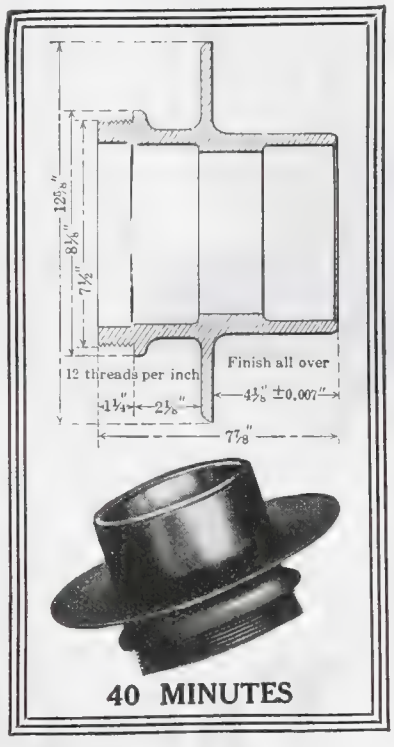
Ask for the complete Grinder story.

Gisholt Machine Co. - Madison, Wis., U.S.A.

Builders of Standard and Automatic Turrent Lathes, Vertical and Horizontal Boring Mills, Small Tool Grinders, Tools, Special Machinery

Canadian Agents: **The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Saskatoon, Calgary, Vancouver, Victoria**

If any advertisement interests you, tear it out now and place with letters to be answered.



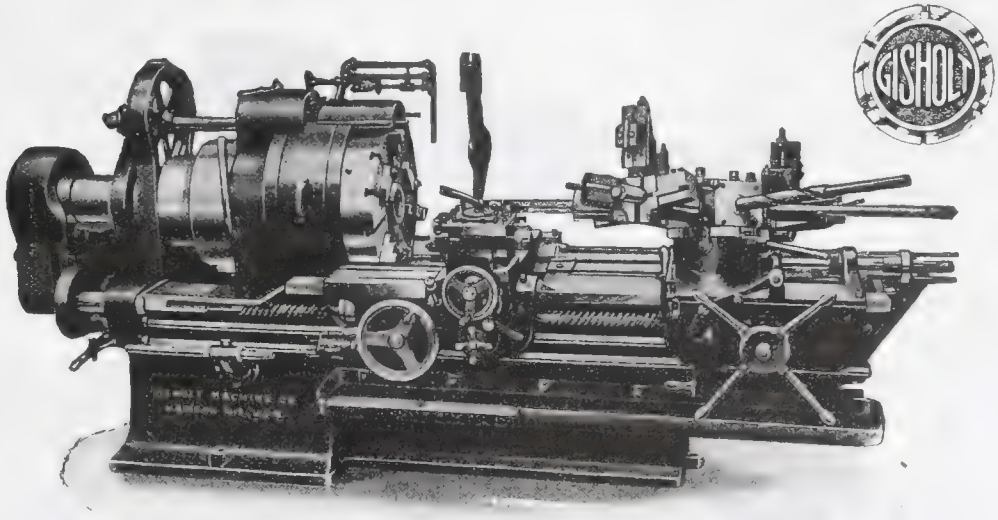
GISHOLT Turret Lathes

Another Gisholt Hub Job Forty Minutes

Standard Tools Lower Costs

Standard tools lower costs not only because they cost less, but because of the time they save. When a job like the above, for instance, can be produced with standard chucking tools, you will see the advantage.

Have you any work that is similar? Compare our production time with yours.



Gisholt Machine Co. - Madison, Wis., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

Canadian Agents: **The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria**

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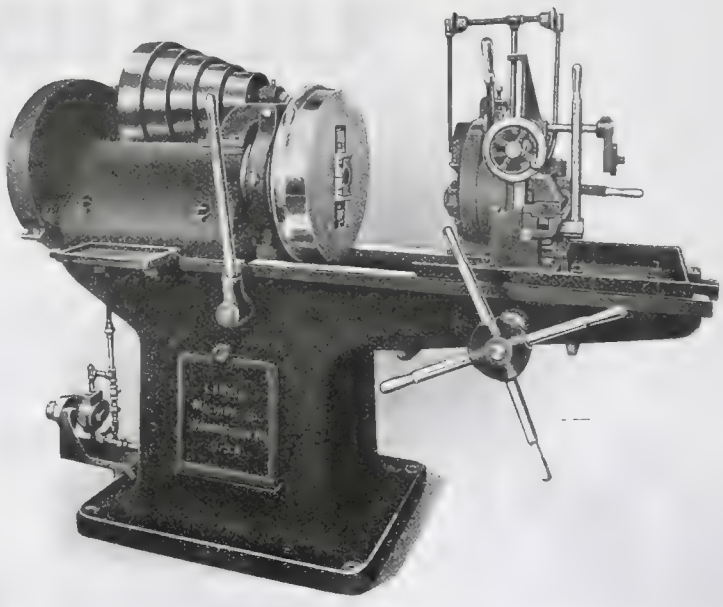


Landis Pipe Threader

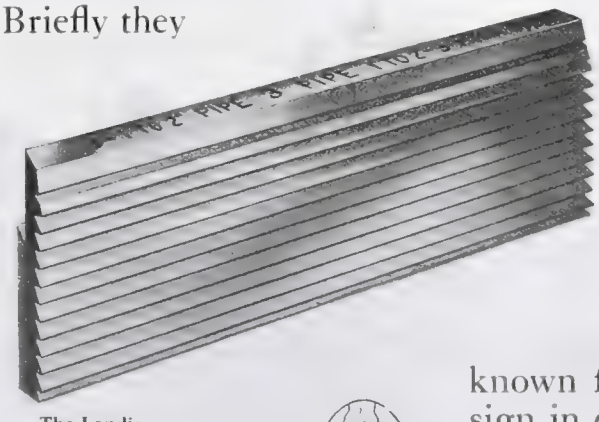
Built with the same well known Landis Die as used on Landis Bolt Cutters

The Landis Die has many points of excellence due to the unique design of Landis Chasers. Briefly they are—

Free Cutting Condition admitting of high speed.

Longer Life, no annealing, hobbing, or retempering required.

The *Rake* or cutting Angle can be ground to suit material to be threaded.



The Landis Thread Chaser

Wide Range and Interchangeability. Anyone of the Chasers can be removed without distributing the entire set.

Fixed Throat insures 10 to 20 times longer life than other dies.

Landis Pipe Machines are well known for their excellent design in every particular.

If you are already equipped let us quote on a Landis Die Head to fit your machine.

The Canadian Fairbanks-Morse Co., Limited

"Canada's Departmental House for Mechanical Goods"

HALIFAX ST. JOHN QUEBEC MONTREAL OTTAWA TORONTO HAMILTON WINDSOR
WINNIPEG SASKATOON CALGARY VANCOUVER VICTORIA

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXI. No. 1. January 2, 1919.

The Precision Measurement of Thread Gauges

In a Paper Before the American Society of Mechanical Engineers the Author Describes the Apparatus Used at the Bureau of Standards For the Measurement of Thread Gauges

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IN the production, test and use of thread gauges there has been during the past few years great development in the methods employed and the facilities available both in manufacturing plants producing thread products and in the inspection departments of the United States Government.

It will be realized that there is quite a difference in the procedure employed in various gauge-making shops, inspection organizations and Government laboratories, and that to give a resume of all the methods used by various authorities would be quite out of the scope of this paper. The methods given herein, therefore, are restricted to those which are in use at the Bureau of Standards at the present time and are the result of the process of elimination of the less suitable pieces of apparatus and the development of other instruments and methods which have taken place up to the present time.

In England the standardization of thread gauges has been carried to considerable refinement by the National Physical Laboratory and by the Engineering Standards Committee of Great Britain, an organization which cooperates with the National Physical Laboratory. At the time the United States entered the present war, one might say that the English were several years ahead in the development of the production and measurement of thread gauges. At the present times there are in the United States all of the important methods and devices used by the English, and in addition improvements have been made in the design of apparatus and new methods of measurement have been developed. In May, 1917, the Bureau of Standards was fortunate in being able to confer at Washington with Mr. C. H. Vidal, a representative of the National Physical Laboratory, from whom drawings were obtained of the various pieces of apparatus used by the National Physical Laboratory for testing thread gauges. Needless to say, the Bureau was quick to adopt the practices which had been found useful by the National Physical Laboratory, and although apparatus such as the projection lantern and pitch-measuring machine had been ordered from the National Physical Laboratory, immediate work was instituted in the construction of similar machines, and long before gauges were being produced in any quantities the necessary apparatus was available.

General Procedure Employed

In the testing of gauges there are two main considerations, namely accuracy and rapidity. While ordinarily the test of a thread gauge is not a precision measurement, the more accurate the methods of testing are, the less time and precaution need be taken by the operator. With reference to accuracy, it will be pointed out that the importance of securing apparatus which will clearly show the defects or errors sought cannot be overestimated. All apparatus should be such that the constant errors and variable errors of observation are relatively small as compared with the permissible tolerances on the gauge to be tested. A great many discussions arise due to the fact that assertions will be made that a particular gauge is within 0.0001 in. or 0.0002 in., when actually two men will differ in making micrometer measurements on the gauge by several times that amount, due to errors in instrument or method.

After precautions are taken for the reduction of personnel errors of observation and errors in instruments, gross errors are often made in the setting down of figures and in making computations. In this connection a system is

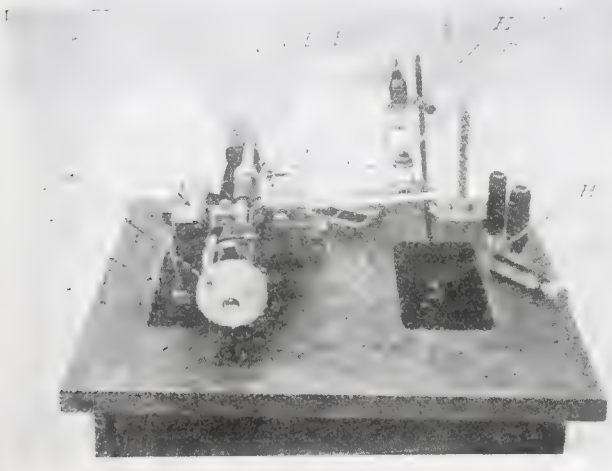


FIG. 1 PITCH MEASURING MACHINE ADOPTED BY THE BUREAU OF STANDARDS.

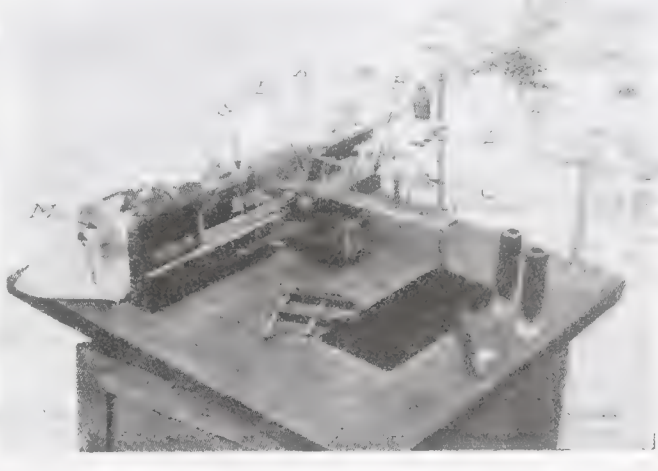


FIG. 2 ANOTHER VIEW OF PITCH MEASURING MACHINE.

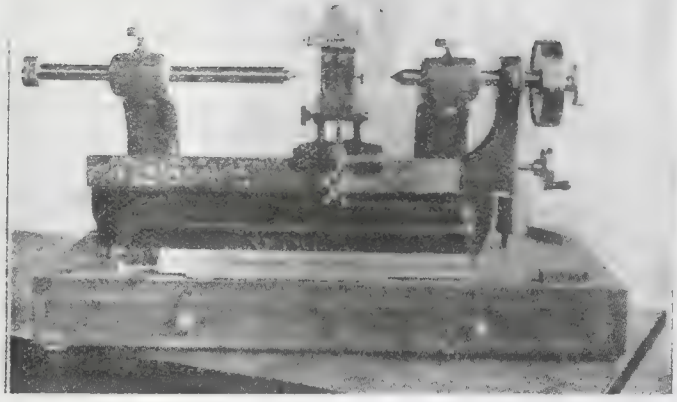


FIG. 4 PITCH MEASURING MACHINE DEVELOPED BY THE NATIONAL PHYSICAL LABORATORY.

FIG. 5 ANOTHER VIEW OF PITCH MEASURING.

in use at the Bureau of Standards in which a gauge is tested by one man on a given piece of apparatus and then checked by a different operator who uses different instruments and oftentimes different methods. This checking method is most effective in the way of preventing mistakes and establishing the value of a given machine or method.

As in any reproduction problem, rapidity may be secured by systematizing the routine of test; by the elimination of small delays, and by the introduction of methods and apparatus especially designed for rapid operation without a sacrifice of the accuracy required.

In discussing the details of thread-gauge measurement, reference will be made first to male threads, as the explanation of the procedure in this case is not as complicated as in the case of female threads.

There are five distinct operations in the measurement of a plug thread gauge, namely:

(a) The measurement of pitch or lead.
(b) The measurement of form and angle of thread.

When it is considered that an error of 0.0005 in. in the pitch or lead of a screw plug of the U. S. Standard form necessitates a reduction in the effective diameter of roughly twice that amount, or 0.0010 in., in order that the thread plug fit a ring of a given diameter, the importance of securing a gauge which is very nearly correct in the pitch or lead will be realized. There are numerous commercial devices designed to serve as comparators for comparing one screw with a standard and thus determine the error in pitch. These comparators are usually designed to measure the pitch over an interval of ¼, ½ or 1 in.

Measurement of Pitch

After trying various commercial machines for measuring pitch, the machine adopted for this purpose by the Bureau of Standards was of a design similar to that of the National Physical Laboratory of Great Britain. This machine, shown in Figs. 1, 2, and 3, is capable of making direct measurements of pitch, and furthermore is not limited to any one thread interval, but determinations of the lead between any two threads may be made. About twelve of these machines have been constructed and are in use at the various branch laboratories of the Bureau of Standards. There are incorporated in these machines special micrometer screws designed and constructed by Dr. J. A. Anderson, who is associated with Mount Wilson Solar Observatory, Pasadena, Cal. These micrometer screws are provided with aluminum heads which are graduated directly to 0.0001 in. and the screws have straight-line calibration curves to within 0.00002 in. They are therefore very well suited for the purpose for which they are used.

The operation of the Bureau of Standards pitch-measuring machine may best be explained by referring to Fig. 1, as follows: A ball-pointed stylus A rests in the thread to be measured. This is carried at the end of a floating arm B which at the other end carries a lens C. The arm B is supported by a flexible, flat steel spring D, and the movable support upon which the spring is carried is so adjusted that the spring D exerts a slight pressure on the floating arm B, which tends to cause the stylus A to rest firmly against the flanks of the thread. When the stylus is resting evenly on both flanks of the thread the lens C is directly beneath the lamp E and the image of the straight filament in the lamp E is projected by the lens C downward to a prism H, thence under the machine to the prism I, from where it is reflected to the screen S. When the image of the filament coincides with a reference line on the screen S, the reading of the micrometer M is recorded.

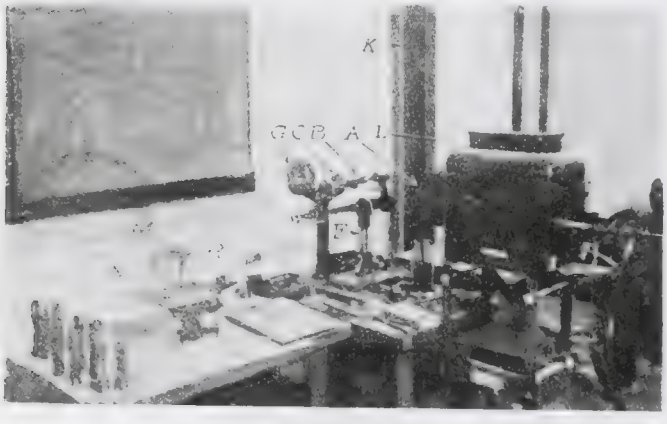


FIG. 6—ARRANGEMENT OF PROJECTION LANTERN FOR THE MEASUREMENT OF THREAD FORM OR THREAD ANGLE.

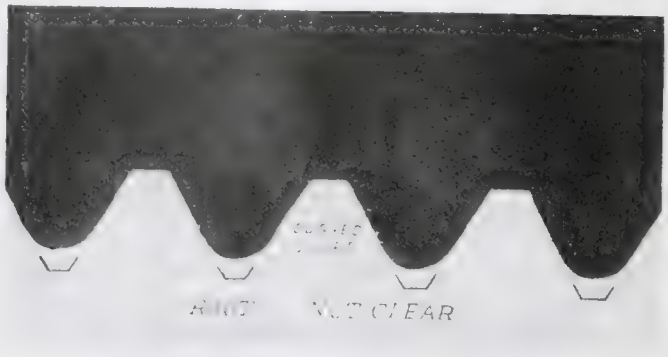


FIG. 7 PROJECTION SHADOW SHOWING THREAD NOT SUFFICIENTLY CLEARED AT ROOT.

(c) The measurement of core diameter.
(d) The measurement of full diameter.
(e) The measurement of effective diameter.

The turning of the micrometer head M causes the carriage supporting the stylus, lens, lamp, prisms and screen to move with reference to the thread, which remains stationary. Upon moving the micrometer head an amount corresponding to one thread interval the stylus comes to a position in the next thread similar to the position in the preceding thread and the micrometer head is adjusted until the image of the filament coincides with the index line as before. The micrometer reading is again recorded. The difference between the two micrometer readings indicates directly the pitch interval passed over.

In a similar manner each thread interval may be measured and the pitch along the entire threaded portion may be investigated. The stylus, lens, lamp and screen form merely a sensitive optical indicator which serves to enable the pitch to be measured with a micrometer head. It is interesting to note that during the course of movement of the stylus from one thread to the next that it climbs up over the crest of the thread and down into the next groove. During this movement the image of the lamp filament is no longer confined to the screen, but the image is again brought back to the index point where the correct position in the next thread is obtained.

The optical indicating apparatus forms a convenient means of standardizing the micrometer head M. When this is done a thread gauge is inserted in the machine as if it were to be tested and flat-end standards or size blocks are inserted between the micrometer spindle and ball contact against which it rests, the carriage being kept stationary and the image of the filament brought oack to the same point with the stylus in the same thread of the thread gauge at each observation.

Questions have been asked as to the result if a thread gauge is not concentric with the centres. If any such indication is present the screw can be revolved 180° and again tested, or it may be turned end for end in the centres of the machine. Experiments in which this procedure was taken with a large number of thread gauges indicate that the difficulties of this nature are of little importance.

Figs. 4 and 5 show a recent development of the National Physical Laboratory in a pitch-measuring machine. This is similar in principle to the one just described. The main difference to be noted is the use of a mechanical indicator which permits the machine to be operated in strong daylight, whereas the optical indicator requires a subdued light or a shade around the ground glass. The micrometer-head arrangement in this machine permits the lead error to be read directly. With regard to the micrometer head, it is to be noted that a graduated disk is supplied for each pitch of the screw to be measured. The graduations on these disks are such that the error in pitch may be read off directly from a scale instead of being obtained by subtracting two micrometer readings. This is an advantage where it is necessary to employ an unskilled operator, but it has been secured by sacrificing in the mechanical arrangement which prohibits the simple calibration of the micrometer head. The only way to verify this machine is to insert a screw, the pitch variations of which are known, and then check the machine from this screw.

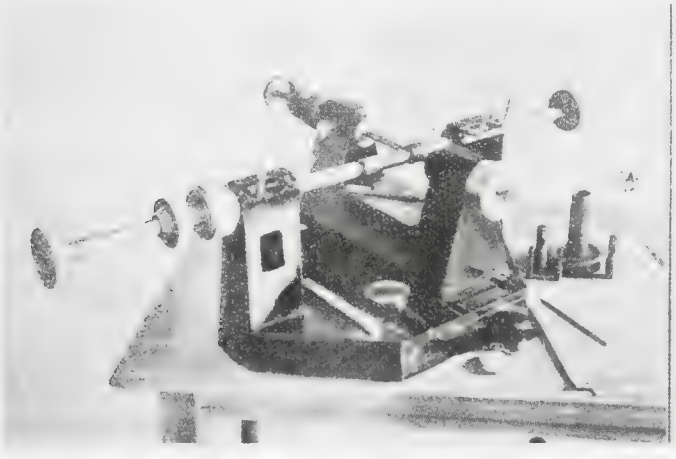


FIG. 9 APPARATUS FOR MAKING WIRE MEASUREMENTS USING TWO WIRES.

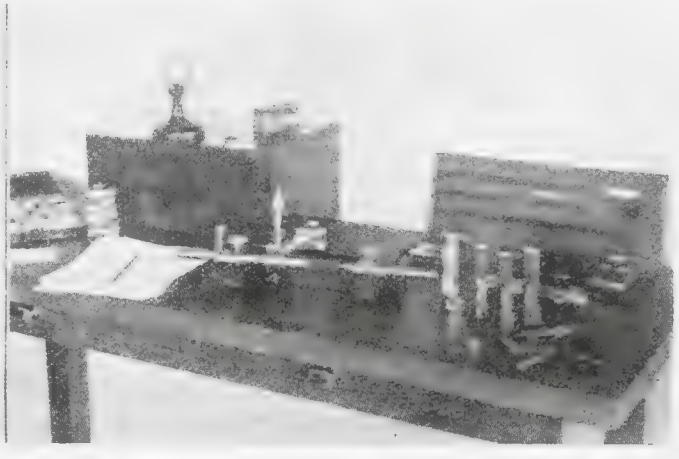


FIG. 8 BALANCED MICROMETER USED IN MEASURING GAUGES BY THE THREE-WIRE METHOD.

Measurement of Form and Angle of Thread

In the measurement of thread form or thread angle various methods such as those employing microscopic devices, conical test points, and other forms of angular test pieces used in connection with visual inspection, have been investigated and tried out, but practically all of these devices have been discarded in favor of the projection lantern. A general idea of the arrangement used at the Bureau of Standards for the projection lantern may be obtained from Fig. 6.

The operation of the projection lantern involves the placing of the thread to be examined in a beam of parallel light, and, by means of a suitable lens system, the projection of the shadow of the thread on a distant screen. In the apparatus shown in Fig. 6, the light from a 10-ampere are enclosed in housing L is emitted through the condensing lens A and directed toward the projecting lenses B and C. The screw is placed at the focus of the lenses B and C. The projection is then directed upward by a prism G to a mirror (not shown) which is supported about 10 ft. above the prism on the column K. The projection is then directed down by the mirror to the top of stage N which forms the screen and carries the standard angle M used in the examination of the thread form. As it is necessary that the parallel beam of light pass through the thread at the helix angle so that the shadow cast will be a true cross-section of the thread form, the lamp housing which carries the condensing lens A is pivoted about a point beneath the lens B. This insures that the beam of parallel light emerging from the lens A will always be directed at and fill the lens B.

Adjustments for Examination.—The setting up of a thread gauge for examination requires but a slight amount of adjustment. The stand E is provided with a motion for raising and lowering the thread, a motion for focusing the thread, and another motion for moving it along its axis in order that various portions of the thread may be brought into the centre of the screen. The screw to be examined is supported by the spring centres which are carried on the stand E. For convenience in making observations it is raised until the centre of the beam of light is passing the under side of the thread. The lamp L is then turned about the axis of its support until the parallel rays of light emerging from the lens A pass through the helix angle, which happens when the fringe pattern formed about the image of the screw due to imperfect focus is symmetrical. The screw is then brought into focus by a slow-motion arrangement and the required adjustments are complete.

Measurement of Angle.—The examination of the thread angle is conveniently made with a device shown on the table in Fig. 6. With this arrangement the standard angle M, known to be 60°, is supported by three columns on the revolving stage or screen N, which rests on a graduated circle or protractor head. In the protractor shown in Fig. 1 the

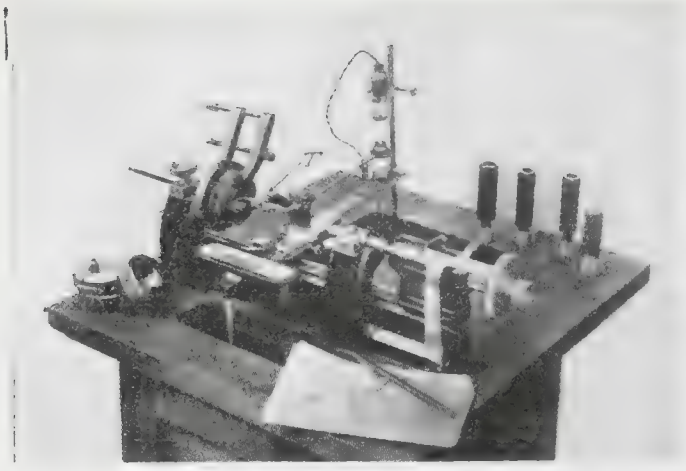


FIG. 10 APPARATUS FOR MEASURING THE PITCH OR LEAD OF A RING THREAD GAUGE.

FIG. 11 CASTS OF THREAD AND APPARATUS USED IN MAKING THEM.

graduated circle was obtained from a theodolite. During the examination of the thread angle, the opaque standard angle M is adjusted so that its shadow occupies the light space of the projected image which is cast on the surface below at N. The standard angle M is revolved so that one side exactly matches with the shadow of the thread as cast below and the reading of the graduated head is obtained through a magnifying glass. The gauge is then shifted parallel to its axis by means of a slow-motion device on the stand E until the image of the other side of the thread approximately coincides with the other side of the standard angle. The standard angle is then revolved by a slow-motion screw operating the graduated circle until it again lines up with the other side of the thread, whereupon a reading of the graduated circle is again obtained. The difference between the two readings shows directly the error of the included angle or thread if the standard angle M represents the correct thread angle.

Further application of the protractor arrangement is in the determination as to whether the thread is symmetrical about a line perpendicular to its axis. This may be verified by revolving the standard angle and matching it with the crest of the thread, or by matching a straight edge which is placed perpendicular to a bisector of the standard angle with the crest of the thread.

Accuracy of the Method.—It should be specially pointed out that the "shadow protractor" is an exceedingly effective device for the measurement of thread angles, much more so than any protractor, lying directly on the plane of the shadow, could be. This is because the eye is viewing two objects of similar character, namely, two shadows. When adjusting the gauge for a reading, the shadows of thread and gauge are made to approach and the protractor is angularly adjusted until only a faint, even thread of light remains between the two. Under these circumstances, an inaccuracy of but a few minutes is easily detected. Furthermore, the operation of the protractor is rapid. In case of particularly defective threads, exposures of the projection may be made on any photographic developing paper—with an exposure time determined experimentally—and a permanent record obtained of the condition of the thread.

Construction of Lantern.—The selection of the projection lens is important. It must be free from distortion over the portion of the projected shadow employed in making measurements. It is desirable also that a short-focus lens be employed in order that a reasonable magnification may be secured with a minimum distance between the lens and the screen.

A lens which satisfies these conditions very well has been secured by combining a 32-mm. aperture, 152-mm. focus, telescope objective (lens B), with a Tessar Series 11B, 4 x 5 photographic objective (lens C). These are mounted in a brass tube so that their separation can be adjusted to a point where the distortion effects are a minimum. When properly adjusted these lenses B and C have a combined focal length of approximately 100 mm., and a magnification of 50 is obtained with a screen at 5.6 in. from the lenses.

Another lens which has been used in place of both lenses B and C, is a Tessar Series I C, 75-mm. focus photographic objective. This lens will give a magnification of about 70 with the same screen distance as with the combination of lenses previously mentioned.

For the prism, it is necessary to secure one which has its three faces accurately flat to within about one wave length of light. The same degree of flatness is required in the mirror, and in addition the mirror must be silvered on the front.

Omitting the Prism and Mirror.—It will be found that prisms and mirrors of the required accuracy are expensive, and moreover, difficult to secure. However, convenience may be sacrificed and the prism and mirror omitted. The image is then thrown horizontally on to a vertical screen and the same measurements made. While the Bureau has not developed a form of shadow protractor for vertical images, it would not be difficult to arrange the protractor for that purpose.

Measurement of Core Diameter

The measurement of the core diameter of thread gauges is in most cases a simple matter. It is mentioned at this point because the examination of the diameter is generally included in the operation of investigating the thread angle and thread form while the gauge is in the projection lantern previously described. It is the practice in most specifications to call for thread gauges cleared or cut below the nominal flat required by the regular United States form at the root of the thread. This is done to facilitate lapping. In order to determine whether or not a gauge is properly cleared when examining the projected shadow, it is only necessary to insert a suitable templet corresponding to the pitch of the screw being measured. If the projected shadow of the thread shows that it is clear below the templet form, it is passed as being correct. Fig. 7 shows a thread which has not been cleared sufficiently at the root.

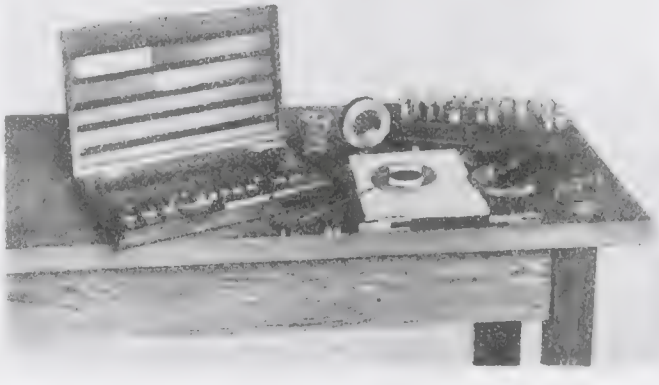


FIG. 12 THREE-BALL METHOD OF MEASURING THE EFFECTIVE DIAMETER OF A RING THREAD GAUGE.

Measurement of Full Diameter

The measurement of the full diameter of plug thread gauges is accomplished by the ordinary forms of flat-face micrometers or other suitable end-measuring instruments used in connection with properly authorized standards. These measurements are so simple and familiar to any one making gauge inspections that no further comment will be made in this connection.

Measurement of Effective Diameter

Of the various methods which have been proposed for measuring effective diameters of male thread gauges, the three-wire method is believed to be the most accurate and satisfactory. This method has been in common use for about fifteen years. In measuring screws by the three-wire method, cylinders accurately ground and lapped to size and diameter are used. These wires or cylinders are inserted in the thread two on one side and one on the other. A measurement is then made directly over the tops of the wires by means of an outside micrometer or other suitable measuring device. From this measurement and from the size of the wire the effective diameter of the screw can be computed.

Choice of Wires

In the choice of wires any size may be selected which will permit the wires to rest on the flanks of the thread and still project above the top of the thread. It is best, however, to choose wires of such a size that they touch the sides of the thread half-way down, or, in other words, at the mid-slope. In this case errors in the included angle of the thread have no effect on the measurement of an effective diameter. Moreover, the time spent in computations is greatly reduced. The best sizes of wire for various threads may be computed from the following approximate formula:

$$G = \frac{P}{2} \sec a$$

where G = diameter of wire, in.
P = pitch in in.
a = ½ included thread angle, deg.

For 60° threads this formula reduces to:

$$G = 0.5774 \times P$$

Specification of Wires

The following extracts are taken from specifications recently written by the Bureau of Standards for purchasing wires for measuring thread gauges: "The wires used are to be of steel. The working surfaces are to be glass-hard and lapped to a high polish. The working surface should be about one inch in length and the wire should be provided with a suitable handle. The handle should be provided at one end with an eye or hole for the purpose of suspending the wire when measurements are taken. On one side of the handle, which is flattened, there should be marked the pitch for which the wire is to be used as the best-size wire and the diameter of the working end of the wire. The working ends of the wires should be round to within 0.00002 in. and they should be straight to 0.00002 in. over any ¼-in. interval. One set of wires should consist of three wires, which should be of the same diameter to within 0.00005 in. This common diameter should be within 0.0001 in. of the size corresponding to the best-size wire for the pitch with which the wire is to be used."

Standardization of Wires

Before the wires can be used to measure effective diameters of threads it is necessary to know accurately their diameters. The wires should be standardized in a way which approximates, as nearly as possible, the conditions under which they are used. In order to accomplish this purpose the wires are standardized with a micrometer caliper by measuring the wire when placed over a standard reference disk, the diameter of which is accurately known. The object of measuring the wire over a cylinder is to approximate the condition of pressure which is exerted upon the wire when it is placed in the screw thread. The micrometer to be used for this purpose should be one which has graduations to ten-thousandths of an inch and upon which hundred-thousandths of an inch can be estimated. This can be secured in one of the similar forms of small precision bench micrometers. Care should be taken to make sure that the micrometer measuring faces are sufficiently parallel. If the wires differ appreciably in diameter, the two having diameters most nearly equal should be used on one side of the thread and the other wire should be used on the opposite side. In the computations the mean diameters of the three wires may then be safely used.

Computation of Effective Diameter

In the computation of the effective diameters of thread gauges, if the exact conditions are recognized the formula is quite complicated and the resulting computations are very laborious. The formulæ for computing effective diameters as given in most engineering handbooks involve the use of best-size wire and do not taken into account the complications introduced when considering the effects of the helix angle of the thread. These formulæ, as generally given, result in securing an answer which should check with the outside or full diameter of the screw being measured. The effective diameter is not mentioned in these formulæ and this often leads to confusion. Reference will therefore be made here to a simplified formula for 60° threads which results in the direct computation of the effective diameter. This formula is as follows:

$$E = M + \frac{0.8660}{N} - 3\,G$$

where E = effective diameter
M = measurement over the wires
N = number of threads per inch
G = diameter of wires

In the use of this formula the term 0.8660/N may be computed for various pitches and the computations simplified.

The general formula which may be used for any size of wire which will fit in the thread and which takes into account the helix angle of the thread for precision measurements, is as follows:

$$E = M - \frac{\cot a}{2N} - G\left(1 + \frac{\sqrt{\operatorname{cosec}^2 a + s^2 \cot a}}{2}\right)$$

where a = ½ the included angle of thread
G = diameter of the wires
= tangent of the helix angle.

The above formula involves squares and square root of functions and therefore is awkward for making computations, and the following formula, which is an expanded aproximation but which is accurate to better than one hundred-thousandth of an inch, is more convenient:

$$E = M - \frac{\cot a}{2N} - G\left(1 + \operatorname{cosec} a + \frac{s^2}{2}\cos a \cot a\right)$$

This formula is a general approximation which may be used for U. S. form 60° threads, Whitworth 55° threads, Lowenhertz 53° 8 min. threads, and for other threads of a similar nature. It should be noted that the error due to the first or simple formula for 60° threads in Par. 34 rarely equals 0.0001 in., and then only when the helix angle is large.

Precautions in Making Three-Wire Measurements

It has been claimed that measurements of effective diameter made by the three-wire method result in values which are smaller than those secured by other means, such as by thread micrometers. This contention is probably justified in some cases and may be due to insufficient care in making measurements. It is important in making measurements that as little pressure as possible be applied on the wires with the measuring micrometers. Since the wires rest in a V-thread, a given pressure exerted on the top of the wire will have a magnified effect of distorting the wire where the contact is made on the sides of the thread. This will result in the measurement over the wires being less than it should be. Furthermore, if the wire is standardized under a light pressure and then used with a larger pressure, the diameter of the wire which is substituted in the formula for computing the effective diameter will be larger than it should be. This difference is multiplied by the factor 3 in the formula and the tendency is to make the result small. Excess pressure is often placed upon the wires during the measurement by use of ratchet or friction stops on micrometers; or by an unskilled operator, and sometimes on account of the arrangement of the wires and the screw thread when the measurements are taken. It is poor practice to support the screw being measured on two wires which are in turn supported on a horizontal surface,

for if the screw is of large diameter the weight of the screw causes a distortion of the wires and interferes with the measurement.

One of the pieces of apparatus used in measuring gauges by the three-wire method is shown in Fig. 8. This apparatus is known as a balanced micrometer. In operation the screw is supported between centres as shown, and the micrometer is supported on a counterbalanced arm which is in turn carried on a cylinder resting in a V-groove parallel to the centres. As originally designed, as shown in Fig. 8, the micrometer was constrained perpendicular to the axis of the thread being tested and two wires were used. The arm supporting the micrometer was overbalanced so that a slight upward pressure was given to the micrometer in order to hold the wire at the bottom of the thread and allow the operator to insert the top wire and make a reading with ease and rapidity. After using this constrained micrometer for some time, it was found preferable to pivot the micrometer clamp on its supporting arm so as to allow a slight movement in a vertical plane passed through the axis of the screw thread and then use three wires instead of two. For this arrangement two wires are carried at the bottom and one wire inserted at the top of the thread as before. This apparatus is very simple in construction and is recommended as being very convenient where a large number of gauges are to be tested.

Another form of apparatus for making wire measurements using two wires is shown in Fig. 9. This instrument was specially designed and constructed for the Bureau of Standards. It embodies a precision bench micrometer accurate to within about two one-hundred thousandths of an inch, supported on a heavy base and carried by steel balls. Their support permits the micrometer uniform contact on the wires at either side of the thread. This machine has been found useful for threads of relatively large diameter. The instrument is of massive construction, and its rigidity, which is not common to ordinary measuring instruments, permits, when precautions are taken to avoid temperature changes, measurements which are accurate to within two or three one-hundred thousandths of an inch.

Testing of Ring Thread Gauges

The measurement of ring thread gauges presents many problems owing to the difficulties with which observations may be made on the various elements. While there are various ways and means of obtaining the measurements required, it is not possible in most cases to work to the degree of accuracy that is obtainable in measuring in plug thread gauges. Very often the special apparatus required for such measurements is not available in commercial shops and it then becomes necessary to judge the perfection of the ring thread by the way which it fits on a male check or checks. The various operations required for measurement are quite similar to those given for plug gauges. The procedure generally embodies the following operations:

a Measurement of pitch or lead.
b Measurement of angle and form of thread
c Measurement of full diameter
d Measurement of core diameter
e Measurement of effective diameter.

Measurement of Pitch or Lead

The measurement of pitch or lead of a ring thread gauge is accomplished as shown in Fig. 10. The same apparatus is employed for measuring ring threads as for measuring plug threads, with the exception that an extension stylus or attachment is provided to project into the ring and transfer the motion of the auxiliary stylus to the ball stylus used on the plug thread. This auxiliary device is shown at T, Fig. 10. Instead of being supported on centres as is the case when a plug is tested, the ring is clamped on a face plate and the operation then is exactly the same as previously explained for measuring the lead of the plug thread.

Measurement of Angle and Thread Form

The measurement of angle and thread form of ring threads is accomplished with the projection lantern in a similar manner to that employed in measuring angle and thread form of plug threads.

In this instance, however, it is necessary to obtain first a cast of the thread to enable the projection to be made. The casts usually used are made of a composition of sulphur and graphite containing about 7 per cent. by weight of graphite. The graphite is added to eliminate reflections which would be encountered on the surface of a plain sulphur cast in the process of projection. Then, in addition, the graphite has a tendency to reduce the shrinkage of the sulphur upon cooling. The procedure in making the cast is to clamp the ring in a vise, the jaws of which have been ground smooth, and pour melted sulphur into the ring, obtaining a cast which is a segment of a circle. The outfit required for this purpose and illustrations of the cast secured are shown in Fig. 11. The operation of pouring the casts with this method is very rapid. After the casts are poured they are immediately marked with a steel stylus with a number corresponding to the test number on the gauge. The measurement of the angle is made as soon after making the cast as possible, inasmuch as experiment shows that the cast warps but slightly during the first five or six hours, but that the warping is considerably greater at the end of twenty-four hours.

Measurement of Full Diameter

The measurement of full diameter is usually made part of the projection operation, as was the case of the measurement of the core diameter of plug gauges. Here again it is only necessary to insert a templet in the thread shadow to ascertain whether or not the thread has been properly cleared.

Measurement of Core Diameter

The measurement of core diameter is usually made with an inside micrometer, Johansson inside set-up, or by the use of go and not-go plain check plugs for this diameter. This measurement of a plain inside diameter requires no further explanation.

Measurement of Effective Diameter

The method which is usually employed for measuring the effective diameter of a ring gauge is by judging the fit of the gauge on a plug thread check. This plug check is ordinarily ground off at the crest of the thread in order to make sure that the plug touches on the sides of the thread instead of at the crest. It is usually considered that when the ring fits snugly on the plug that the effective diameter of the ring is the same as the plug. This assumption, however, is not strictly true, inasmuch as there always is certain variation between the lead or pitch of the plug and the lead or pitch of the ring, and furthermore, variations of angle between the plug and the ring are always present. Both of these variations necessitate the ring's having an effective diameter larger than the plug upon which it fits snugly. In most cases the amount actually required for fit, due to differences in pitch and angle, is appreciable, sometimes as much as several thousandths of an inch.

In order to ascertain the effective diameter where check thread plugs are not available, the three-ball method of measurement has been adopted. In making these measurements the ring is laid on a flat surface with the axis of the thread perpendicular. Two balls are then placed in adjacent threads and a third ball is placed diametrically opposite. The distance between these balls is then taken by inserting size blocks together with a taper parallel, as shown in Fig. 12. The effective diameter can then be computed in a manner similar to that explained for male screw threads, as it is necessary to change only the signs of the different quantities of the formula as previously given for wire measurements. The formula as corrected by the change of signs is then as follows:

$$E = M - 0.8660 \times p + 3\ G$$

where E = effective diameter
M = measurement between balls
p = pitch in inches
G = diameter of balls.

This formula applies in cases where the balls used touch nearly at the mid-slope of the thread.

Toronto.—Sealed tenders, addressed to the undersigned and endorsed, "Tenders for concrete piers, Quinte Division," will be received until 12 o'clock noon, Saturday, December 14, for the removal of the present substructures and the construction of seven concrete piers at the Trent River Crossing, mileage 43.5, on the Maynooth Subdivision, being situated at Glen Rose, about thirteen miles north of Trenton, Ontario. Drawings and form of contract may be seen and specifications and form of tender obtained at the office of the Engineer, Maintenance of Way, 68 King Street East, Toronto. C. N. Railway, 60 King Street East, Toronto.

The Electric Furnace in the Grey Iron Foundry

Converting the Lowest Grade of Scrap Iron Into the Highest Grade of Pig Iron—Its Practicability Clearly Demonstrated and Its Future Forecasted in a Favorable Light

By F. H. BELL

WORKS OF THE BOWANVILLE FOUNDRY CO.

THE Bowmanville Foundry Co., whose works are shown in the accompanying illustrations, can proudly claim the unique distinction of being the pioneers in Canada of melting gray iron for ordinary foundry purposes by electricity, and in doing so have demonstrated to their own satisfaction as well as to that of others who have seen the process in operation, that the electric furnace in the iron foundry has a future before it full of promise. As every foundryman is aware, the demands upon the available iron supply during the years in which the war was in progress were so great that it became necessary to conserve every possible pound of iron, either to be converted into steel or else to be used in such iron castings as were required to help in some way to win the war, and those foundrymen who were not engaged in turning out some line of war material found it an exceedingly difficult matter to secure supplies. Here was a company who had long enjoyed the enviable reputation for producing a line of high-grade light gray iron castings, including stove trimmings, piano trimmings, piston rings for automobile engines, hardware and novelty specialties, all of which required the highest grade of pig iron. In addition to this they had a department for the manufacture of light steel castings in which they had just recently installed an electric furnace of 500 lbs. capacity. They also have a nickel-plating and polishing department, a polished brass department, and a wire goods department, fully equipped with electric welding machines, etc., but, unfortunately for them, none of their lines could be considered essential from the standpoint of wining the war, and as a consequence they were debarred from securing the raw material with which to keep their works in operation. To all of this they cheerfully acquiesced, but in doing so they found themselves with only two alternatives to choose from. The one was to close down until after the war (a proposition which was not to be considered) and the other was to secure iron from some source, and in this they were successful. As has been previously mentioned, the class of work being turned out was such that nothing but high-grade pig iron could be used, and if good scrap could have been secured it would not have filled the bill, but even this was not easily procured, but the source from which they were enabled to draw was the cast iron turnings and borings of which every machine shop has an abundance, and which had hitherto been considered as of little practical value, and by utilizing the electric furnace the difficulty was solved.

Had this class of metal been charged into the cupola the bulk of it would have been blown out through the stack and the balance would have been mostly slag. With the electric furnace none of this trouble is experienced as there is neither blast nor fuel to contend with, and consequently no oxidizing, and very little carbonizing.

C. E. REHDER,
Vice-President and Assistant General Manager Bowmanville Foundry Co.

The furnace, shown in the accompanying engravings, Figs. 1, 2, 3 and 4, as well as the control board (also shown in Figs. 1 and 2) and the transformers, were installed under the personal supervision of Mr. C. E. Rehder. The furnace was manufactured under Gronwall patents, and the control is of a type manufactured by the General Electric Co.

The electrodes are controlled automatically by d. c. reversible motors, with shunt field to act as a magnetic brake, but can be controlled by hand if so desired; control board is operated by 110-volt d. c. current, with raising and lowering control for each electrode.

This furnace operates on a two-phase circuit, each electrode carrying one leg of each phase and the bottom or hearth is conducting and acts as neutral or common carrier for other leg of each circuit.

The primary supply is three-phase, and is connected by a modified "Scott" connection to the two transformers. The transformers have a capacity of 75 k.v.a. each. The furnace, as we have 10-hour day will melt 4 heats, but if successfully handling 625 lbs., and in a 10-hour day with melt 4 heats, but if run continuously will melt 13 heats in 24 hours. To accomplish this requires 650 kilowatt hours per ton of cast iron, and an average of 8 lbs. of electrode per ton of iron.

For the benefit of the practical foundryman who is not familiar with electrical phraseology we will endeavor

FIG. 1—SHOWING CHARGING DOOR, ALSO CONTROL BOARD AND ELECTRODE LEADS.

to explain in as intelligible a manner as possible the construction and management of the electric furnace. It consists of a steel shell of the design shown and lined with what is known as magnesite brick, leaving a basin or crucible 24 inches by 36 inches and about 16 inches deep below the level of the door. The metal is charged into this brick basin through the end door shown in Fig. 1, and the electric current enters from the top through the electrodes, also shown in Fig. 1 attached to what would appear to be a jib crane. The manner of melting will perhaps be better understood if compared to an electric arc lamp with its upper and lower carbon, and the electric arc between them. If the bottom carbon is removed from an arc lamp and an iron one put in its place the arc would still form and cause light for a short time, but the iron would melt away and the top carbon would follow it until it was all melted. This is precisely what takes place in the electric furnace; the iron which is to be melted takes the place of the bottom carbon, while the electrode acts as the upper carbon. As the iron melts it falls to the bottom of the basin, and when all is melted, silicon, and whatever other elements are required to bring the metal up to the proper chemical analysis are introduced through the charging door and are rapidly absorbed by the melted iron. The electric current keeping the metal in continuous motion, thoroughly mixes it and at the same time purges it of impurities. Lime is used as a flux and to form a slag, while fluorspar is used to regulate the fluidity of the slag. When the metal is melted to the proper temperature the electric current is turned off and the slag is drawn from the door shown in Fig. 2.

In Fig. 3 is shown the tilting mechanism on the side, also the spout at rear end with workman opening the tap hole preparatory to pouring.

Fig. 4 shows method of pouring into pig bed; the furnace, resting on trunions, is tilted by means of hand wheel and gear on the side. This iron was poured into pigs, which were later melted in the cupola in the ordinary way, the double melting entailing extra expense, which would be unnecessary if the furnace had been installed with a view to being used in the gray iron foundry, and the company has plans for an overhead carrier system to deliver the iron to the molders and do away with the second melting.

That the electric furnace will become a successful competitor with the cupola furnace is certain on account of the ease with which special mixtures can be melted and the quality of the resultant metal. The one outstanding drawback is the original cost. On this point we will quote abstracts from a paper by John A. Crowley of Detroit, an expert on the subject. He says: "A volume might be written on the subject of furnace design, yet in this paper I wish to touch but briefly on the mechanical and electrical characteristics of the furnace designed for foundry operation. It is often difficult for a foundry man to appreciate the cost of building an electric furnace, and when shown the figures, the average foundryman considers the price as exorbitant. In discussing furnace design, one furnace operator remarked, and very aptly so, " Give me a furnace of workable design, one easy to manipulate, with good electrical characteristics, and I will show you a furnace that will pay handsome dividends." From this, as well as from Mr. Rehder's experience, we bespeak for the electric furnace a successful career.

FIG. 2 SHOWING WORKMAN SKIMMING OFF THE SLAG

New Deaf Mute Institution. — The Manitoba Government, through Hon. A. Grierson, Minister of Public Works, announced recently their intention of building a home for the deaf and dumb. The institution, which will cost approximately $500,000, will be started as soon as plans are prepared.

FIG. 4—SHOWING METHOD OF POURING INTO PIG BEDS

FIG. 3—SHOWING TILTING MECHANISM, ALSO SPOUT AT REAR

Canadian Industries and the Export Trade

Canadian Government in the Past Neglectful of Opportunities —Alive to Present Possibilities—German Credit Methods of Fostering Export Trade Resulted in Enormous Business

By J. F. HEFFRON

WHAT methods will Canada use to extend her foreign trade markets after the terms of peace have been definitely settled? In what manner will Canadian manufacturers attempt to gain their fair share of trade in the commercial markets of the world now turned topsy-turvy by the exigencies of war, and in which markets a gigantic readjustment is bound to occur when the world returns once more to a normal peace basis?

The action that will be taken in regard to these questions holds a vital relation to the future commercial development of the Dominion, a future pregnant with many wonderful possibilities, and the present is the psychological time at which these questions should receive the close consideration they demand, for the immediate future promises to place before the Canadian manufacturer certain opportunities the energetic and scientific encouragement of which may develop a vast business that will exercise a steadying influence on Canadian trade for all time.

In the past, Canada has been lax in the matter of developing foreign trade. She has been content for the most part to supply only such demands as have generally been directed her way by outside forces. Too frequently our Governmental departments supposed to look after this phase of our commercial activity have given proof in such matters of an indifference only equaled by their incompetence. Our administrations have seemed totally destitute of the commercial and industrial sense in any large or broad form. When in the past they have tried to intervene in such questions they have often done so with a clumsiness which almost made their abstention preferable.

During the course of the war, and at present, our Government has taken some steps in the right direction towards obtaining a share of the requirements of the Allied nations. An attempt is now being made to broaden out the machinery originally built to take care of war requirements so that it may continue its operations indefinitely. If this work on the part of our Government is directed intelligently much good should result, but so far, its scope is confined to Great Britain and her allies. The creation of a new Canadian trade commission has just been announced. This commission will have its headquarters at Ottawa and will co-operate closely with the Canadian mission in London with a view to securing for Canadian producers a share in the business arising out of the reconstruction work in France and Belgium and other war devastated parts of Europe. If the commission be given proper powers and be permitted to use them, working in an energetic manner they should be able to do a great deal towards extending our markets, they can do a great deal in making known to the people of Europe the products Canada has to offer for sale; this in itself will be a great step in the right direction.

Our Minister of Trade and Commerce has also applied for thirty booths at the next Lyons Fair, which opens on March 1, 1919, and continues for two weeks. Some of the booths will be used for a general Government exhibit of agriculture, forestry and fisheries, minerals and metals, but most of the booths will be placed at the disposal of the Canadian manufacturers for a display of products available for exportation to France. The expense in connection with this exhibit will be assumed by the Dominion Government. This action on the part of our Government will go far to remove the lack of knowledge the French people have regarding Canadian products. While they are well acquainted with the prowess of Canada's soldier sons, they know nothing of the products of the commercial or industrial life of our country. This lack of knowledge on the part of our prospective customers has been a great handicap to the extension of our foreign markets.

Some Canadian manufacturers, it is true, even before the war, had experienced a certain measure of success in securing business outside the borders of the Dominion, but our normal export activities have been directed almost exclusively to foodstuffs and raw materials with which we are well equipped by nature to supply.

Having at our disposal the raw materials and the power with which to manufacture products, the next step to be accomplished will be to find producers. It is almost certain that peace will see an influx of emigration into the Dominion unparalleled in our history. No doubt it would be well to observe that our immigration system will require revision. Instead of dragneting Europe for people and testing their fitness to be Canadian citizens after they arrive, there should be a scientific sifting at the ports of emigration or at Government depots established abroad. However, with our present population, with our returning soldier sons, and the looked-for newcomers, we should be able to organize a force of workers, engineers, chemists, business directors and travellers second to none in the nations of the world.

Could we now direct our concerted industrial efforts, or even one-half of the concerted effort displayed during the war, to the development of our foreign commerce. Could we direct this effort towards this new problem in an energetic and scientific maner, the future commercial life of our country holds for us a vista more rosy than that conceived of by our wildest dreamers heretofore.

The manner in which poverty-stricken Germany of 1870, holding scarcely a place in economic geography, was able in some forty years to become one of the great forces of the economic world, presents certain phenomena of unparalleled interest to any consistent person interested in the problem before us.

The German Method

The methods employed by Germany in the field of international trade and finance are little known although every manufacturer has heard of the wonderful development achieved by German industry in a relatively limited period of time.

With an external trade of $5,000,000,000, the German Empire occupied on the eve of war a position second only in importance among the mercantile states, with the first place held by Great Britain. She had become the second largest producer of pig-iron and iron, exceeding even the output of Great Britain, while as a producer of steel she was again the second largest in the world. Her merchant marine, inferior in 1870 to that of Canada at present, was in 1913 outnumbered only by those of England and the United States.

From the fact of her late entry into the field of foreign trade, both necessity and competition made Germany inventive. Being one of the last to enter the world's arena for international business, she was forced to devise and use new means by which to secure trade.

International Banking

The Germans early became aware that the function of financing trade is of predominant importance. They had before them on the one hand the experience of British importers of whose trade methods they were quick to take advantage, while on the other hand they found as though prepared for them, the machinery of British banking institutions which they used for the extension of commercial credits.

The Germans financed their foreign trade largely through London, although they occasionally used Paris and other money markets. Sometimes they financed their transactions through the country to which they were exporting. In doing so they were relieved of the financial burden of trade but were under the obligation to allow their transactions to pass through the hands of foreign banks, thus revealing some of the details of their work which they preferred for obvious reasons not to disclose. Thus they early understood the necessity of entering the field of international banking on their own account.

They realized at an early date that in many instances a British bank could not, for example, be expected to give them the necessary information and ad-

vice they required because, leaving aside patriotic considerations, doing so necessitated the bank's encouragement of German competition at the expense of an old customer engaged in the line investigated and so eventually worked harm to itself. In the same measure as the old customer lost trade the bank would weaken its own position in exchanging an old and tried customer for a new and untried one.

This problem of information that is so vitally important in foreign trade—since Germany conducted her business on a credit basis—was partly solved by the creation of powerful credit organizations having branches all over the world.

Entrance into the field of international banking possessed other attractions besides. First, it was a profitable gap to be filled in the world's money-changing machinery, and thus offered profits as a business in itself. It further offered the attractive possibility of dealing in credits, thanks to the machinery of the British open-discount market. Again, banks in far-away countries had a distinct advantage of time and place. Money rates are usually high in countries very distant from the big money markets—that is the advantage of place. To instance the advantage in time, a draft drawn on a European centre from such a distant country is paid only on arrival, some twenty or thirty days later, during which time the buying house can use the money gratuitously. International branch banking is the highest form of efficient banking from the superiority of its central organization. Germany quickly took advantage of this since she could supply very little capital of her own to the country with which she was doing business, but could find the money either in the importing country itself or in the large money markets of the world. Her success proves that much still remains to be done in developing this branch of our international activity. The scope attained by Germany's trade development was due in great measure to the fact of having brought to life an elastic financial machinery so as not to be handicapped by inadequate financial instruments.

As Creators of Demand

The Germans offered credit to their customers primarily because other merchants sold chiefly on a cash basis. They soon found that credit is a creator of demand and therefore an incentive to consumption and at the same time a stimulus to production and the saving of capital. In the early stages of their experience and even later, at the height of their activities, the Germans naturally learned some costly lessons as a result of carrying too far their credit liberality. This is seen clearly in the case of Japan.

When the Germans entered the Japanese field they offered Japanese merchants credit inducements which were, as a rule, unknown at that time in that country. Japan's trade had been strictly on a cash basis until then, i.e., deposit with order, balance against documents on delivery. In 1906, when numerous failures followed the great Japanese boom, the Germans suffered heavy losses. Allowing the Japanese excessive credit and extending their indebtedness more and more, the Germans had gone far beyond the real necessity of credits and thus made the buyer overbuy. At that time the Japanese buyer, so far as the middle class was concerned, stood far beneath the European merchant. Germans had overlooked that important point. Their work accordingly had rather a corruptive influence. By straining the buying capacity of the dealer, the German credit accommodation disorganized the market rather than assisted it.

Where business ethics are undeveloped and the merchant is unacquainted with such arrangements even in his domestic trade, credit facilities may well constitute a danger. In such a country the dealer is inclined to consider goods which he does not pay for immediately as having been acquired by his own artfulness Being unable to realize what a commercial obligation is, he will necessarily try to deceive his creditor.

Credit to be sound must be self-liquidating. In normal conditions, if less time is allowed than is necessary for the merchant to dispose of his goods, it will mean putting obstacles in the importer's way to his merchandising, and will eventually lead to underestimating his ability and thus limit his activity to the actual amount of his cash or his own limited financial arrangements. Allowing too much time to the importer means encouraging him to neglect his obligation and consequently to overbuying and speculation. Sometimes it will even make him actually forget the existence of his debt and make him fall a victim of his own embroilment and exaggeration. The Germans, however, in according their credits, took into consideration the conditions of the country. In Russia, for instance, which was known as a country of small turnovers and slow liquidations, long credits were of vital necessity, especially in Siberia and other less civilized Russian regions. As a rule German terms were 90 days sight draft or open account for the same time.

The Germans reasoned somewhat as follows: In a small German town, in every line of trade there is a certain number of small dealers who are good for a credit of a certain amount. As there are many such towns in Germany there are plenty of these small good credit risks. Now, if that is true of Germany it is true of other countries and of all the world. In business, as in philosophy, and, shall we say, in war, the Germans like to embrace the whole of the universe.

This was really something new in foreign trade. The English exporter for instance would deal only with first-class, big concerns which were already known as large importers. The idea apparently did not creep into the English exporter's head that there were other merchants besides these. The Germans thus discovered a new working class of importers. To give these smaller dealers such facilities as would enable them to buy and to pay, just as the Germans did with their domestic trade, meant, according to the theory of probabilities, to build up a sure, conservative clientele of "geographical distribution" as the financier would say. The individual units were good because small and conservative, and because credit granted them was only such as their character and ability warranted. The number was still better, since the magnitude of the number of units made it possible to depend less on any one of them.

The Merchant Marine

The Germans early understood that to own a powerful merchant marine is a condition *sine qua non* for a country which aspires to become a prominent factor in international trade. To find what is known among exporters as the "material carrier" is therefore of the greatest importance. In our Canadian export trade heretofore we have been obliged, in most cases, to either charter a vessel or use such ships in the British or other carrying trade as call at our ports. It is gratifying to know that our Government has now in course of construction thirty-nine steel vessels, two of which, the Pioneer, of 8,100 tons and the Voyageur, 4,350 tons, are nearing completion. If the good work the Department of Marine is carrying on in this connection is permitted fullest extension we may soon see the flag of Canada's merchant marine in the important seaports throughout the world.

Returning to Germany's merchant marine, it is not necessary to dilate here upon this subject. For the vast development of this line of her endeavor to capture the world's trade, she has given too much publicity for it not to be known. However, in order to give a clear idea of her progress as a sea power, these brief statistics will be of interest.

From 1886 to 1908 her commercial tonnage rose from 298,000 tons to 1,982,000, almost seven times its former capacity.

Clearings of German vessels at German ports only, and bound for foreign ports, rose from 7,900,000 tons in 1883 to 66,000,000 tons in 1906, more than eight times their quantity.

Articles for Export

The Germans did not stop at their expansion of international branch banking, credit of facilities, at their discovery of a new class of importer, nor at the building of their own merchant marine. They went further even than this. They discovered new articles to sell.

Perhaps the most characteristic feature of their export trade was a huge mass of articles for export, such as were frequently absolutely unknown in Germany, and which were manufactured solely for the use of customers in foreign countries, or in certain regions of a country, in accordance with their national needs, studied in advance.

When the Canadian or American salesman came back from a business trip as he often did, with the melancholy assertion that there was nothing to do with a certain country or section of

country for his manufacturer's goods, the Germans worded the same impression otherwise. They said instead: "The country needs such and such things. Can we offer them?". While the Canadian and the American looked to see if there was anything doing in his line of business the German looked to see what line of business there was in which he could do something. He was willing to adopt samples and to undertake the manufacture of articles for which he himself had no use in his own country. It was a difference in point of view of great consequence to the exporter. The German discounted the possibilities and opportunities, the Canadian and American on the contrary were more on the side of conservatism and statics.

An authentic story is related by Prof. Henri Hauser, of the University of Dijon, which well illustrates this attitude of the German exporter. In Dijon, France, a certain kind of mustard tray, representing pigheads in Prussian casks, were on sale. German diplomacy becoming aware of this lèse-Prussian fact, made a protest. The ensuing investigation showed that the trays came from Germany. A French dealer, bothered by the incessant visits of a German traveller, to get rid of him gave this order, which was accurately executed.

The German went to a country with the confident idea of doing business, and since there is business in every country, he was sure of success because he was willing to satisfy the buyer as to goods, to conditions, and to terms. What he had to do was to find out what goods in his line were needed and for which there was already a demand, or for which a demand could easily be created. Whenever such goods could not be manufactured by himself he was ready to buy them in any other country in order to make sales as a broker. The Canadian and American as well as the English exporter sent his samples, very often unwillingly, in an inadequate, haphazard form, and was deeply dissatisfied when people abroad failed to recognize the usefulness of such goods.

I have been told by a Brazilian, well acquainted with the attempts of English exporters to maintain and extend commercial relations in Brazil, that the inflexible, stubborn manner in which the English merchants refuse to yield or to adapt themselves to the customs and usages of those with whom they may be dealing, accounts in great measure for the difficulties they encounter in the extension of their business.

To illustrate by example what has already been said, there are certain imported articles of commerce that the Brazilian merchant desires should be prepared, or got up in a certain way, in order to please the ultimate purchaser or consumer. If this particular way does not happen to be in accordance with English custom, or English modes of manufacture, the request is entirely disregarded. This attitude causes frequent complaints, and undoubtedly has resulted in a considerable loss of business. The motto of English merchants, judging by some, at any rate, who do business in Brazil, seem to be, observed my friend, "You must take it our way or go without," and before the present war they did go without, as to the English goods, usually getting them from Germany instead.

According to this Brazilian, the Germans impressed them as being most accommodating and adaptable on this point. Their travellers went about studying the markets to learn what goods were required, and how they were required, and in whatsoever way they were preferred; that way was adopted by them. Sometimes the matter was a very trivial one to comply with, but, if it pleased the consumer and influenced the sale of the article, it is surely worth considering. This experience in merchandising is not confined to South America alone, it is true throughout the world. Any salesman having wide experience knows that a possible purchaser may come to a decision for or against a given article merely from the way in which it is got up, quite apart from its quality.

It will always be true of our transactions with other people, in order to get the most profit for ourselves, we must think more of the other and less of ourselves. That was the German merchant's psychological policy, and it was found in the smallest details and technicalities of his work in international trade and finance. It was in the German merchant's readiness to satisfy any reasonable demand of the customer. It was in the adequate and desired packing, in prompt, accurate delivery, and shipping, in punctilious performance. It was perhaps, before all, in the courtesy of not only refraining from sending to a country a man unfamiliar with its language, or of sending one speaking the language but without business education, at least concerning his line, as did other merchants, but of avoiding as well corresponding in any other language than the buyer's.

The German Valnays printed catalogues in the language of the country to which he sent them. There are still many people who do not understand that it is a waste of time to address a foreigner in any language other than his own, for, even though he understand it, he comprehends with difficulty, and the message is not as clear to him as when written in his native language. Moreover, a German catalogue in two different languages was not a mere copy from one language into another. It was a real adaptation, not only in style but in substance, and in the selection of goods presented. The adaptataion was made according to the needs of the buyer. Thoroughness was disclosed in this feature as in other work.

This success of the German exporter was also due in great measure to his custom of quoting laid down prices in the town of buyer, and in his money, as well as in terms of his own weights and measures, thus giving him an exact idea as to the total cost of his goods, an advantage which other importers overlooked.

The German exporter endeavored to reduce the effort of the buyer to the minimum, leaving to him his only natural function—selling—and taking up all others, such as the custom broker's, the commission merchant's, who previously bought for cash and resold on credit to the merchants, they made the dealer more or less independent in his function of merchandising and opened his way to success. By all these methods they abolished that grim spectre of the smaller merchant, the wall between foreign and domestic trade. All this of course was not done for charity's sake but because the German realized that his prosperity had only one basis, namely, the friendship, interest, and prosperity of his buyers.

Cheapness of German Goods

The cost of German labor, contrary to the popular belief, was at least as high as in France, and only a little lower than in Great Britain. It was higher than in all other countries of Europe. In order that we may not wrongly conclude that with our high cost of labor in Canada we cannot hope to compete in countries where labor is lower in price, we may note that the higher cost of labor in Germany did not prevent Germany from conducting successfully business with countries where labor was incomparably cheaper: Italy, Austria, Russia, Spain, etc.

The cheapness for which German goods were famous lay in the fact that the Germans, like the Americans, indulged more and more in manufacturing on a vast scale, although they did not go as far as the Americans, among whom it is common to refuse an order which slightly departs from the standard.

The Germans' chief reliance was on research, since their genius knew but little of inspiration and real inventiveness. On the contrary, it was the country of application, assiduity, and thoroughness. In the course of their tremendous self-growth they became aware of the disorganizing, conflicting contradictions of our social life which results in waste of every kind. The reason for this waste lies in the fact that a million wills are freely directed towards different vaguely determined ends, and the resultant force of these conflicting cross-purposes is what determines our social regime.

This waste of energy is to be seen in all the activities of our social and industrial life, in the mills and in the schools, in our science as well as in our religion, in our family as in our everyday life.

It is because there is too little organization of any of our activities, except as they have been organized under Government control for the success of the nation at war, which action on the part of our own and the other allied governments during the course of the war seems a sufficient proof that our former methods lacked the efficiency that is to be attained through co-ordination.

It is easy to understand that the correction of this waste should begin in the economic field. In business, in the factory, it means a saving of money. The business interpretation of energy is

money. It is there that it was first discovered because these every-day arguments for competition are sought. Time and motion studies mean a paying argument in the hands of a manufacturer. Once this is begun it will naturally continue and spread to all of our activities.

As an instance of the beneficial results shown by these efficiency methods, we may point out that Germany had fifty blast furnaces less than England, yet in 1907 Germany was able to produce 2,000,000 more tons of pig iron because of her system of distributing labor, her co-ordination of industries, and her mechanical improvements, and yet it was not long ago that the iron industries in Germany were conducted by English mechanics and engineers.

We talk of efficiency and system, but the Germans not only talked, they did them.

It is true that perhaps no other nation could unite the different contradictory wills of its members so efficiently. The reason for this lay primarily in the German character accustomed to discipline and obedience. That is why the orders elaborated and sent from above were so diligently and emphatically executed by the people. Other nations were undoubtedly eager to develop, but the ways and means employed by them to bring about such development have been entrusted to politicians rather than to experts. The Germans looked for the practical benefit-bearing side of a science, for science applied. German international policy was an international enterprise, a business enterprise conducted on a scientific (logical study) basis under the benevolent auspices of the Government.

There are too many features involved in this assistance given by the state to German concerns in their foreign trade enterprises to treat of it in this article. Perhaps we may doubt the value of the German system since it became the blind tool of an imperialistic ambition in the German plan of international politics. But this need not be the necessary outcome of such a system properly applied. We have written of the good points in the German system, and many of these, were they incorporated in our own social and industrial structure, would undoubtedly redound to our own material advantage.

It is our hope that these few details of the great structure which comprised the German international trade policy will have been of interest to the reader who has followed us thus far. We hope also that our Canadian manufacturer will insist upon some practical form of Imperial co-ordination in trade. This it would seem can only be attained by securing the close and untiring interest of Canadian manufacturers who will insist upon an efficient political administration, and who will develop their future expansion along scientific lines. If this be intelligently and scientifically done we may look forward to a greater future for the greatest overseas Dominion under the British flag.

WOOD BLOCK FLOORS

It is of the highest importance that the ground beneath a wood block floor should be prepared absolutely firm and unyielding, and the surplus earth from the foundation trenches should be evenly distributed over the whole surface so that by exposure to rain before the building is covered in, and the constant traffic of the workmen for a period of several months, the bottom will become thoroughly hardened and consolidated.

When the ground is firm enough the surface should be levelled off at a depth below the floor level equivalent to the combined thickness of the gravel filling, the concrete bed, the cement floating, and the wood blocks, so that the face of the latter may finish at its proper level. On the levelled bottom a filling either of broken brick or of rough gravel should be laid to a thickness of not less than 6 to 9 inches; if dry gravel is used it should be well damped and then rammed down to its proper level.

Next comes the bed of concrete which should be not less than 4 inches thick, and as it is necessary to bring this to a true face, pickets should be driven in in rows about 9 ft. apart and levelled to each other so that their height above the gravel filling is equal to the thickness of the concrete. These pickets will act as guides to which screeds can be laid, and when the concrete is filled in it can be struck off level from the screeds with a 10-ft. straightedge.

The concrete should be gauged 5 to 1, that is, five parts of clean washed gravel to one part of cement; these proportions should be carefully measured and not merely approximated. It should be seen that the gravel is really clean, and that gravel and cement are thoroughly mixed together while in the dry state, which can only be secured by turning the mass over at least twice.

When ready for wetting, supply the water through a watering-pot or a hose fitted with a fine rose; water poured from a bucket or from a watering-can without a rose is so irregularly and unequally distributed that much of the cement is washed out and lost. The common practice of flooding the concrete with water to save another turning over should not be tolerated; satisfactory results can only be obtained by steady watering, even though this may entail an extra turning over to bring the mass to a proper consistence.

When the concrete has become firm enough to walk upon, the cement floating should be done; it should be from ½ in. to ¾ in. thick, and gauged 1 part of cement to 3 of good sharp sand, thoroughly washed. Dots should first be levelled and screeds run about 9 ft. apart, and as soon as the screeds have become steady the body of the floating should be laid in and struck off level from the screeds with a long straightedge. No attempt should be made to finish the face with a hand float or hollow places would result; as soon as a room is completed it should be barricaded, and when the floating has firmly set, scaffold boards should be laid down so that the cemented surface may not be damaged by walking upon it. The laying of blocks should be deferred as long as possible in order that the cement may become thoroughly dry. The time taken in drying will depend upon the weather and the time of year, but in any case several weeks will be required.

If the laying of the blocks is deferred to the latest possible moment they will not be so likely to sustain damage or to lose their freshness in consequence of traffic over them with dirty and heavy boots, for although the floor, after being cleaned off should be thickly covered with clean sawdust, which should be kept on to the last, currents of air will expose portions of the floor, which are pretty sure to be walked on, and stains and nail marks will be the result. For these reasons it is better that the blocks should not be delivered and laid till they are actually required. They are very dry, and therefore very sensitive to moisture, and if allowed to get damp before they are laid, especially in the winter time, open joints may be expected in the following summer; if, on the other hand, the blocks, though perfectly dry, are laid upon a damp bed, no surprise need be felt if the floor rises.—M.E.

HETEROGENEITY OF STEEL

It is explained that if a section of steel be polished and treated with dilute sulphuric acid the markings will be dependent on the rolling, while iodine will color the impurities and a cupric solution will leave stains. The results visible to the naked eye are designated "macrography" in contrast to "micrography," which shows quite different results.

In the tests specially described in this article the authors state that they believe the macrographic heterogeneity of the steels is due to oxygen left in a solid solution in the metal, and they give the reasons for this opinion. The tests were made upon electrolytic iron alone and with the addition of sulphate or phosphate of iron in silica tubes heated in a gas furnace with a blast which raised the temperature to the fusing point of iron in 40 seconds. The chemical composition of the test pieces was as follows:

(1) Electrolytic iron melted alone; (2) iron oxidized during fusion; (3) iron containing 0.136 per cent. of phosphorus; (4) iron oxidized and containing 0.168 per cent. of phosphorus; (5) iron with Fe_2O_3 added; (6) iron oxidized and containing 1.19 per cent. of sulphur.

The existence of oxygen in solid solution in the iron may afford an explanation of a fact pointed out some time ago by Mr. Mahler—e.g., the electrical resistance of merchant steels can be calculated very exactly from their chemical composition and by allowing a determined resistance for each of the foreign bodies in the iron. (Comptes Rendus, September 30, 1918.)

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

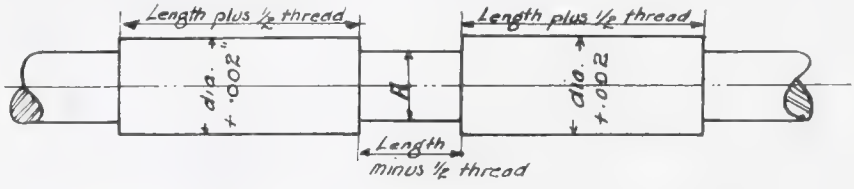
RE-DRAAWING STEEL IN THE MACHINE SHOP

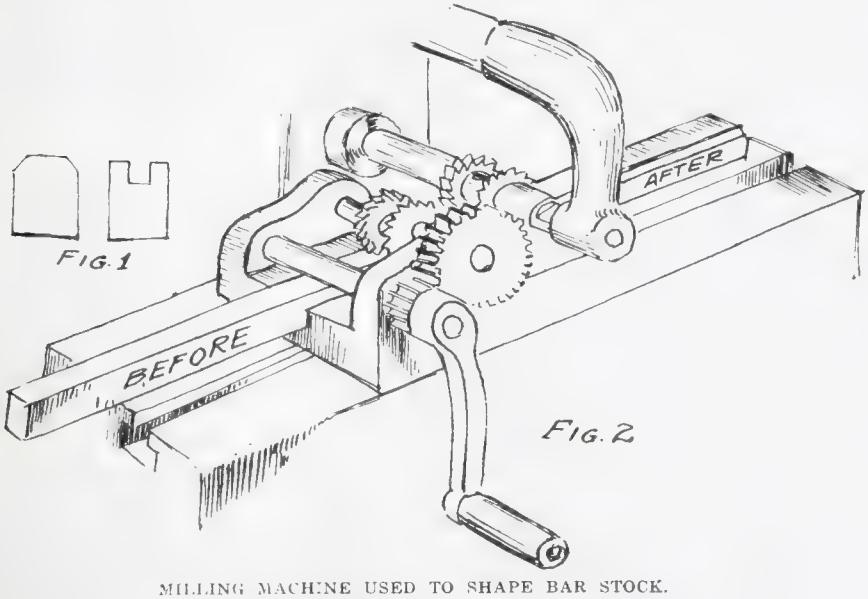
By D. A. MIDDLETON

THERE was a time when manufacturers could get two hundred pound lots of cold drawn steel of odd sizes and shapes, and get it at a month's notice. But that was before 1914. Numerous manufactured articles were built up around a piece of steel so cleverly drawn that a piece machined to the same shape could not compete with it. When the mills got to where they could no longer handle special work, many of these articles disappeared from the market.

A device for converting standard shapes of steel into specials—redrawing it, as it were—is shown by Fig. 2 and in Fig. 1 will be seen two of the simpler forms that by its use were made possible at low additional cost. In this case, the bars as received from the mill in the form of specials had always been put into saws and millers and cut up into the desired lengths, which varied from one-half to one inch. It would have been manifestly too expensive when the supply of special shapes was cut off to cut up regular stock and then mill the pieces to the required form as previously drawn, but, by the use of this device, mill length bars were run through and shaped before they went to the milling machines.

Reference to the drawing shows that the work was done on a milling machine. The machine is set up for producing the piece shown to the left in Fig. 1. Two bevel cutters correctly spaced on the arbor assure a duplication on all the bars. The bar to be shaped is fed against the cutters much as if it were held in the vise, but the table does not move in this case. The bar is fed through a slot in a shoe of cast iron bolted to the table, fed by turning the crank at the side, which drives a pair of 45° cutters that bite into the corners of the bar just enough to drive. Feeding at the rate of twelve inches per minute transforms standard shapes to specials at a low figure. An adjustment is provided for different widths of bar. With the shape at the right of Fig. 1, the corners are not taken off and the feed cutters leave their mark, which is not objectionable in this case when the burr is filed off. Sometimes the desired shape can only be made by running the bars through twice. It has proven to be a quick method of getting what was wanted when it was wanted, and at no great initial expense.





MILLING MACHINE USED TO SHAPE BAR STOCK.

MAKING TWIN SCREWS FOR TWO JAW CHUCKS

By H.R.H.

This is a job which often causes the average machinist more or less concern. Both right and left hand threads on the one bar, both start at the same line to insure a true gripping at the jaws of the chuck.

First operation. Center and turn the stock to size plus .002" in the portion to be threaded, turn ends and center journals, not to size, but to outside diameter of screw minus the double depth of thread to be cut; make length of threaded portions one-half thread longer than required, as described below.

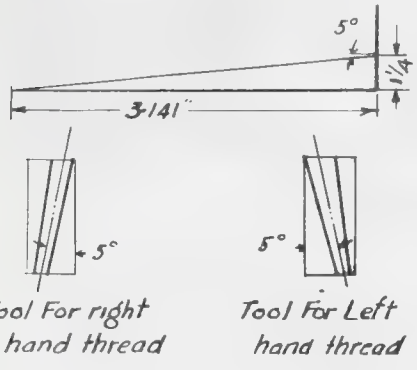
Second operation. Place in lathe centers and scribe a line from end to end, Then starting to cut thread with the tool cutting edge dead on the center line, and a full width inside of the end, doing same for both right and left hand threads, cutting until the reduced portions are merely touched. Finish journals to size.

HINTS ON CUTTING SQUARE THREADS

By H.R.H.

Considerable difficulty is often experienced when cutting square threads, because the back of the thread is often torn by the tool, when near the proper depth. This can be entirely overcome by the following rule: Strike a line the

exact length of the circumference of the screw to be cut, then a line square to it at the bottom; on this strike off the length equal to the pitch of the required screw; join this point and the top end of the circumference line; this gives the angle at which to grind, or



TOOLS FOR SQUARE THREADS

set the tool over to prevent tearing. Thus: If we want to cut a thread one inch diameter four pitch, the circumference of the one-inch circle is, 3.141"; the pitch is ¼ in.

PATENTS AND CONTRIBUTIONS

By A. S. H.

It is a debatable question as to how to make the best use of a new idea, that is from the point of view of its originator. When the bright and glittering thought or improvement first swims into consciousness one is apt to look carefully round in a rather suspicious maner to make quite sure that no halo of glory betrays its existence to the onlooker. With stealth therefore we nurse the new found infant until leisure gives time to reflect. Of course difficulties will arise since it must be tried out and probably adjustments and amendments are still to make. However, there is a positive conviction we are on a good thing and the query is how to get the most out of our discovery and turn original thought to best personal advantage. The next scare is whether our device is first in the field and how many promising first thoughts have come to grief upon the obstacle of prior discovery it would be gratuitous to count, the num ber would be endless. Exploitation of a new device is essentially costly and troublesome, marketing and selling is to the mechanic a new untried and doubtful field. We do not wish to give anything away and ideas submitted to an employer have ever been suspect, or rather good faith for valid reason if it's suspected in this connection.

It is necessary to decide therefore whether the idea is patentable, if a market exists and again the economic possibilities open, at this assuming that the idea is sound.

A first patent is a very precious thing but essentially costly if of real mechanical importance, apart from state dues and agents' fees. The amount of time consumed in getting the thing in a really practicable and economic condition is considerable. Trying to break down the iron wall of prejudice is a lengthy proceeding, and all the world in the shape of manufacture seems in league to destroy confidence in the inventor. Considering that 95 per cent. of patents do not produce enough to pay renewal fees and that probably only one per cent. brings home substantial returns, it is questionable whether patenting even a device showing promise, all things considered, is worth while.

Even the basic patent which starts a new industry rarely returns anything at all to its originator; he does missionary work, breaking inveterate prejudice for little if any return. If the device is an improvement the existing device probably fills its purpose in a sufficient manner that no one is willing to pay the royalty involved for the new design. Collaboration with an employer is beset with many pitfalls and the inventor can hardly hope to compass affluence in this wise. It must be always remembered that the majority of improvement patents are in restraint of trade to prevent flagrant copying by competitors.

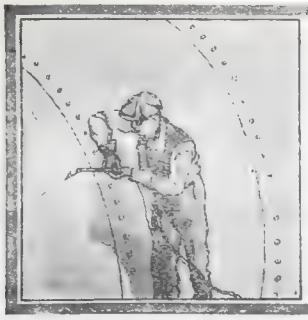
The fact remains, however, that most first rate mechanics have at some time or other been bitten; at first they were afraid to give details save under the seal of secrecy. Later on in desperation they would be glad if some enterprising individual were to steal the idea; something might be made out of infringement.

The total revenue of the business of patenting has never been disclosed; agents' fees, state dues, experimental work, time absorbed and advertising expenses must total a huge sum. It is doubtful in the writer's opinion whether the total business return (which is a penalty laid on the community at large) equals the expenditure. Yet the community as a whole benefits from the industry of patenting. It may be a lottery to the inventor but it is the patent office files which blazon the path of mechanical evolution. The state makes a profit out of the fees and by citing interferences helps to clarify the ideas and the original work done educates the inventor. but the effects are largely intantor. Thought, like matter is indistructible, but the effects are largely intangible, for the material returns do not balance the outlay. In all probability without the bait of possible large returns (the exceptional instances are for many reasons prominent) mechanical art would not have progressed in the same rapid maner. There is an alternative to patenting, whose returns are certain if not large, the worries of which are infinitesimal, there are no state dues to pay and the originator of quite a simple improvement gets due credit. **Sell your ideas to the technical press.** It is quite a while since the writer came to the conclusion that it is better to publish than to patent. Moreover, ideas have a value expressible in tangible form and the technical press exists to ventilate them. He frankly confesses his failure as an inventor, inasmuch that his attempts, which were submitted to various critics, elicted commendation at all events in those quarters not likely to manufacture. His failure in the business of marketing led him to the belief that sale in the form of contributing was at all events the more profitable plan. He believes his views are shared by others; at all events the returns are prompt and secure and involve neither renewal fees nor agents' accounts.

The Heald Machine Co., Worcester, Mass., have recently issued a new catalogue on their magnetic chucks. The use of magnetic chucks for holding work to be machined has greatly increased during the past few years, and this catalogue deals with many applications of the chuck and the different varieties needed for various classes of work. It is stated the adoption of magnetic chucks will often increase the production of a machine 50 per cent. or more by the elimination of lost time in setting up the work. Another benefit attained by the use of these chucks is the greater accuracy of the work produced or when firmly holding thin pieces the chuck does not warp the work as is so likely to happen with ordinary holding devices. Illustrations and descriptive matter given show very clearly the use of the Heald magnetic chuck for quantity production and for the holding of work which has to be machined by the taking of heavy cuts. The chuck is shown holding thin pieces of work and holding other work of similar nature for quantity production. The mechanism of the chuck itself is very clearly explained by numerous illustrations and descriptive matter and arrangements for different classes of installation are also dealt with very fully. In many cases it is advantageous to have the chuck so held that it may be pivoted about one or more centres as desired, and for this purpose the Heald Company manufacture a taper and Duplex holder for their rectangular chucks.

Large Locomotive Order.—The Montreal Locomotive Works have recently received a large order from the Canadian Government Railways for several locomotives of the type known as the Santa Fé, which are considerably larger than the well known Mikados. They are the heaviest type of locomotive used on the Canadian railways and are noted for their great hauling power.

Comes to the States.—The James Howden Co., a well known English firm engaged in the manufacture of forced draught apparatus for marine boilers, also water tube boilers, have opened a factory and office at Wellsville, New York State, where they will carry on the manufacture of their various lines. They have fitted a number of the ships for the Imperial Munitions Board with their boilers and forced draught systems.



WELDING AND CUTTING

DIFFICULT REPAIRS SUCCESSFULLY ACCOMPLISHED BY WELDING

THIS article and illustrations are descriptive of repairs effected by the oxy-acetylene welding on a crank shaft and piston. The crank shaft, which belonged to a compound three-cylinder hydraulic pump, working against a pressure of 900 pounds per square inch, had developed a crack across the web of the high-pressure crank. This may have been caused in any one of several ways, which are immaterial here. An attempt was made to repair it by making long clamps to fit over the length of the web, and shrunk on to draw the crack together. The clamps were bolted as shown by small bolts, ⅝ inch diameter, which served to hold the clamps in their place. This was not a successful remedy, needless to say, as it was but a short time until the working of the crank caused the clamps to get slack, and allowed the crack to open and close at each revolution. This went on until the crack had gone right through the web, the crank shaft then being in two parts. It was decided to have the shaft welded, it being impossible to get a new shaft for some months, deliveries being so uncertain. The shaft was about 10 ft. 6 in. long, with three cranks, and about 4½ in. diameter, and weighed about 1,200 pounds. The welder elected to perform the job with the shaft on

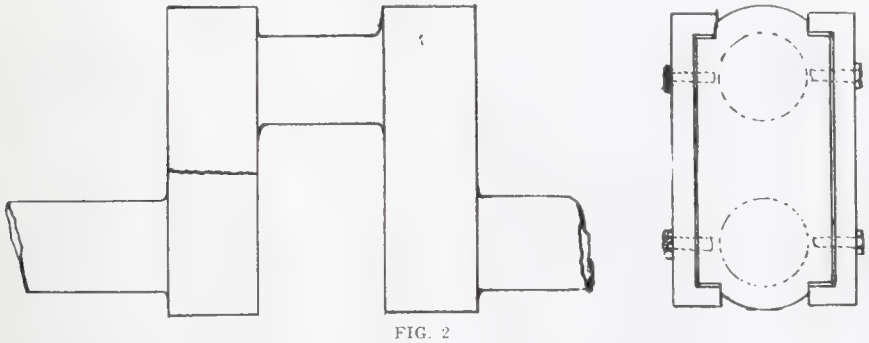


FIG. 2

end, as he could work it more easily in that way. One end was put in a pit and shored up solid, and the part of the broken web on that piece beveled off. The other half of the web being beveled off to make a V when the shaft was put together, the other end of the shaft being lifted up by a pair of chain blocks and the halves of the web brought together. The job was now ready for blocking up, and this was done by leaving the top half hanging on the chain blocks and shoring from the wall to prevent moving. The welding then took place. The actual time for preheating, forming the V and welding, not including the setting up, was five hours. The next job was putting the shaft in the lathe, and when this was done it was found to be out of true. The torch was applied to the crank pin of the welded crank, and when warmed up to a red heat the shaft was tapped on the high spots till practically true. The bearing journals were then touched up in the lathe, about 3-64 in. being taken off the outermost bearings to nothing at the centre ones. This job lost something of its success by faulty machining, as after the shaft was put back in the pump the high-pressure crank pin was found to be slightly out of true, a fact which gave considerable trouble in the running. The welding itself was a strong and well finished job, and as far as it was concerned the shaft was as good as new.

The accompanying illustration (on page 16) shows a broken piston follower plate, which belonged to the auxiliary hydraulic pump and had the bad taste to get the follower plate broken in three places while the shaft of the main pump was away getting welded. This occurred through one of the follower plate cap bolts working out and fouling the piston, breaking the follower plate and a piece out of the piston. The break occurred on Saturday morning and the pump had to run on Monday or put a large part of the factory out of business. The factory being situated some thirty miles from town, and no welding facilities being available on the spot a long distance call was sent to the welding company in town. They were instructed to have everything ready to start on the job as soon as it arrived in their shop, and to get it finished and ready to ship out again the same night. The job arrived at the welders at 2 o'clock and left there again at six, completed. The piston was a 16 in. diameter, and the follower and piston together weighed 150 pounds. It had to be welded carefully so as to go back in the cylinder without turning or fitting, and these conditions were fulfilled and the pump put together Sunday morning. This shows the possibilities of welding in emergencies and the value of having an outfit on the premises if the size of the plant warrants it.

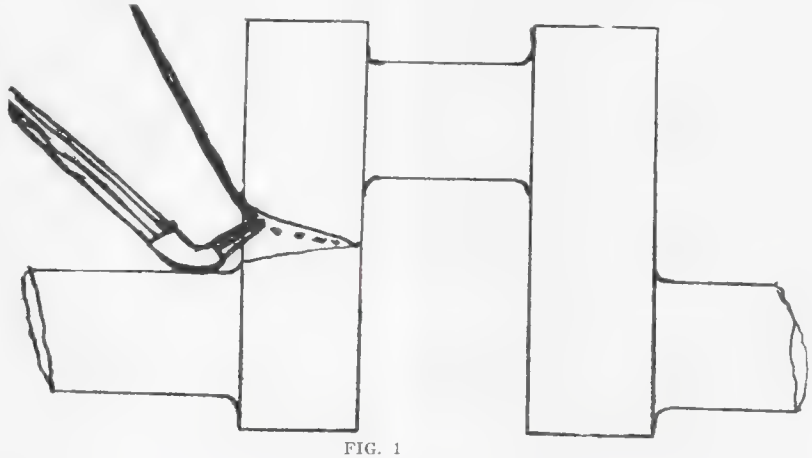


FIG. 1

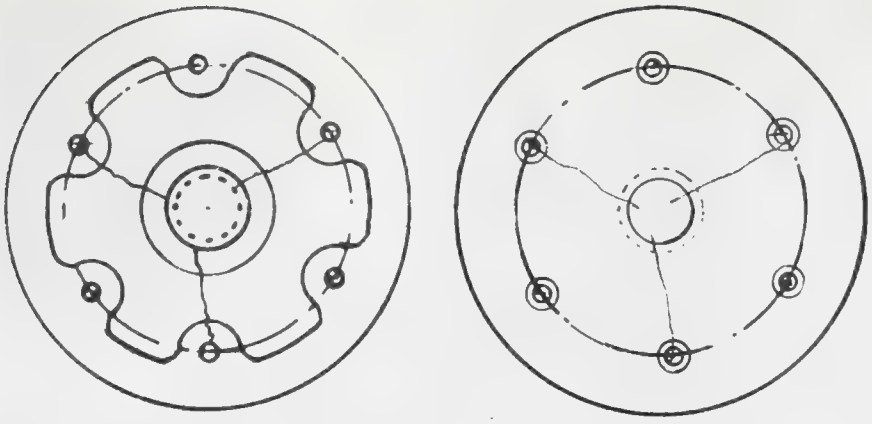


FIG. 3

PURCHASE AND SALES

By A. L. H.

"Well bought is half sold," is an axiom of business so true that its quotation would be superfluous unless there were good reasons for its mention. For some hidden and esoteric mystery, purchase is apt to rest almost entirely with the clerical staff.

Few, indeed, are the firms who delegate a qualified technician to do their buying, though there seems ample justification for such a counsel of common sense. We hear much about the sales engineer, his training and functions, but the department upon whose economic functions rests the ultimate price of the finished goods has received less attention.

The reason why commercial travellers are a separate and peculiar caste, in few instances having definite and first-hand knowledge of the wares they offer, is a most puzzling problem. Is it because the technician is hedged around with technicality that he rarely makes an expert salesman, or is it mainly because he will not submit to the treatment meted out by a large number of firms, who make the less brass bound feel like a small boy guilty of misdemeanor? Some firms whose own representatives are expected to bring home orders are the reverse of courteous to the representative of another firm calling upon them.

New Standards Needed

Buying is certainly an art at least of equal importance with sales, and, in fact, the buyer and seller are so intermixed in a large number of instances that it is difficult to sort out where one activity ends and the other begins. Few firms are buyers or sellers only—most are both, and as a consequence there is no valid reason why a new attitude should not be displayed. Possibly one of the reasons why the selling representative gets such short shrift is because his limitations are obvious to the buyer. There is a new standard wanted of real qualification on both sides—the buyer qualified to know value and the seller qualified to meet expert questions upon level ground. It is possible also that commercial representation in a personal sense has been much over-done, and too much accorded to the breezy personality of the man who travels.

In engineering buying, if engineer meets engineer less time is wasted than if the usual representative meets the usual buyer, neither of whom is competent to discuss, without further references, the finalities of the deal.

Discrepancy in Prices

One thing which puzzles the buying engineer is the enormous and disproportionate prices tendered for identical material, where the requirements are explicit and the tenderers are keen for business.

Between highest and lowest bids for identical material there is sometimes as much as 100 per cent.; such a disparity points to a loose screw somewhere. Many firms resent it if they know they are put in competition with others, and expect naturally to obtain subsequent orders merely because they have been favored previously, but right buying consists in selection and elimination—not in precedent. It is, of course, difficult to place competitors on the same basis, but right buying consists in seeing that bids are obtained for identical material. Where the credit of the purchaser is good and payment prompt there seems little excuse for differing prices, if the quantity be equal; yet such disparity is too often found. It implies that the buyer is less keen, that his instincts are less acute and that the vendor is piratical in intention. Nearly every traveller will, if present, shade his price somewhat, and this presure is in essentials a vicious thing. Equal price for equal quantity to all customers is the correct attitude; if the price be altered it should be to all alike. The point is raised because it is by no means universal practice; in fact it is rarely practised at all. To take advantage seems commerce, as understood by most of its exponents, and it is submitted that there is, or can be, no justification for such an attitude. It is, moreover, obvious that in a concern of some magnitude a single purchase authority must buy. Its first function is to obtain explicit requisition, quality, quantity and precise conditions are obvious, and it is the technical end which must settle these points. The chief of the purchase department in an engineering or metal working concern should be a broad-minded, common-sensed, trained and qualified engineer; he should have the commercial experience in some shape or other, but this is by no means indispensable. It is part of his functions to be responsible for stock and stock keeping of all material; he should in effect be the store's superintendent.

It is also part of his business to suggest that where expensive material is in question other material equal for the purpose might be tried. It frequently happens that the designer whose acquaintance with prices is very remote, specifies material, and in many instances may be led to revise his views by moral persuasion. The substitution of cheaper material has in many cases led to large reductions in cost.

The Right Buying

However, premising that the cost is justified, hand-to-mouth buying is the most expensive method. Incremental buying for regular delivery in specified amounts at due intervals, from a basis fixed for periods of months, is the wiser course. Obviously, it is unwise to keep large capital tied up, and for this reason alone the purchase department needs to exercise care. The buyer may shade the price 2½ per cent. if he stocks up for a couple of years, but the money so expended ought to be charged interest. There is one asset every buyer believes he has, this is intuitive fore-knowledge of market changes, but a man so blessed should be in the financial world pure and simple. For the manufacturer there is only one counsel—when in doubt follow the market.

The Trade Press

The main raw materials of manufacture anywhere gets prime consideration, but the less prominent deserve at least as much consideration. The hardware requirements of an engineering firm often involve quite large aggregate sums, and it will pay any purchase engineer to become acquainted with the trade press. By this is meant not so much the technical journals, which deal directly with engineering products and material, as those which are erroneously assumed to belong to a different category.

Perusal of these often serves directly to impart information of source of supply otherwise outside the knowledge of the purchase agent. It is very curious how the odd bits of knowledge become vital over a lapse of years, even the most casual reading of the trade press helps to keep the buyer up to date. At the present moment more than ever, diligent search through advertisements will uncover possibilities quite unrealized. Yet many firms with some false notion of economy have chosen the present time to save by withdrawal of subscriptions and rigid cutting down of the journals taken. The fact is that the present moment is one to extend the list, the price of a subscription is more than covered if a single pointer proves of service. The problem at the moment is not selection from many alternatives, but the discovery of some source from which delivery at a reasonable date may be expected; hence the value of trade press advertisements and notices.

DEVELOPMENTS IN SHOP EQUIPMENT

Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

TRAVELING RADIAL AUTOMATIC SCREW DRIVING MACHINE

THIS machine has been designed for work that is too large or heavy to manipulate by hand, but which comes within a convenient range of dimensions where it can be served by a machine of the traveling radial type.

For a class of work that may be built up on a bench or special form and that has screws driven before removal from bench or form, a movable or traveling machine can be used to advantage. The machine illustrated is entirely controlled by one operator.

The usual spindle bearing driving mechanism and magazine are mounted on a head which is carried on an I-beam. This I-beam being attached to a pivot bracket that turns in pivot bearings in a saddle which is mounted on a column and is adjustable for a height within any convenient working range.

The head carrying the magazine and spindle mechanism is mounted on the I-beam wtih roller bearings, making it very easy of operation for lateral adjustment.

The Reynolds No. 5 radial can be equipped to handle a range of screws varying from No. 2, ⅜-inch in length, to No. 8, 1 inch long. Power is provided by electric motor mounted on pivot bracket and coupled direct to the spindle shaft carried under the beam.

The carriage or base has wheels mounted on ball bearings. The carriage is moved by hand cranks placed at end of beam near operator's usual position, the connection to the axle being by shaft and universal joints.

In operation the driving of screws can be started at either end of work and longitudinal lines of screws driven by combining swing of arm, movement of head on arm and movement of carriage, and the lateral or angular lines of screws are driven by movement of head or arm, swinging the arm and moving the base to new position as required.

While any range of action within reason may be secured, this machine will cover a width of 36 inches, giving angles of 30 degrees, or a width of nearly 4 feet in direct cross lines at right angles to column. Obviously any reasonable length can be secured by making provision for electric wires. The controller for operating machine is carried by the same bracket that carries motor, thus bringing it within easy reach of the operator.

Reynolds screw driving machines are all power driven, thoroughly automatic magazine machines—dump a gross or more of wood or machine screws promiscuously into a hopper, press a lever and the screw is driven quickly without marring, to any desired depth, by a spindle running from 600 to 800 R.P.M.

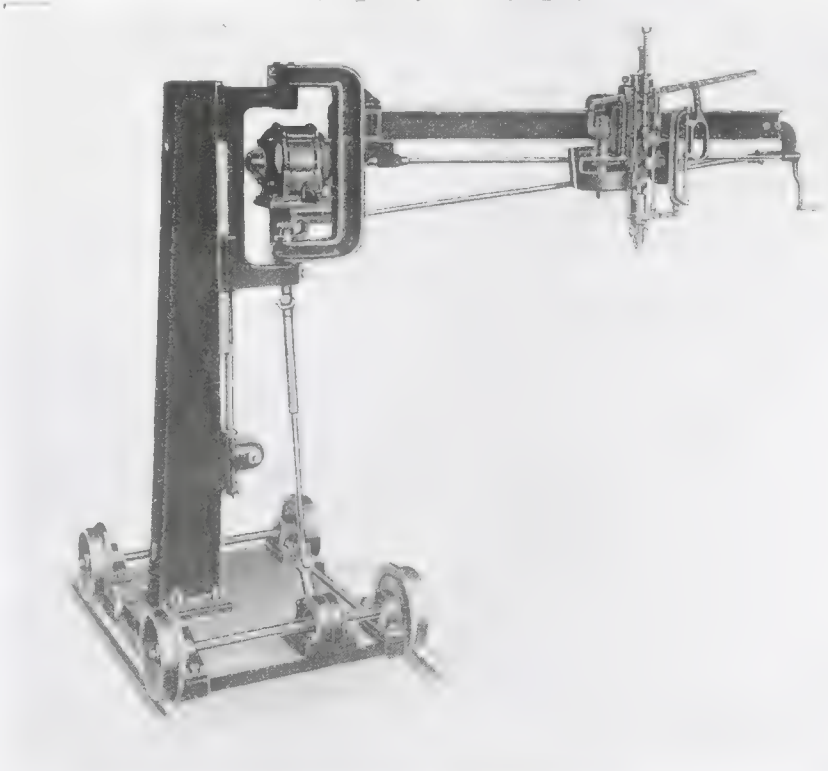
Reynolds screw driving machines are all equipped with friction-driven spindles, permitting screws to be set as tight or as loose as desired.

This machine is also manufactured with a fixed base, retaining all the features of the traveling radial with the exception that the machine remains stationary and is used where work can be carried by truck or otherwise placed within range of the radial arm.

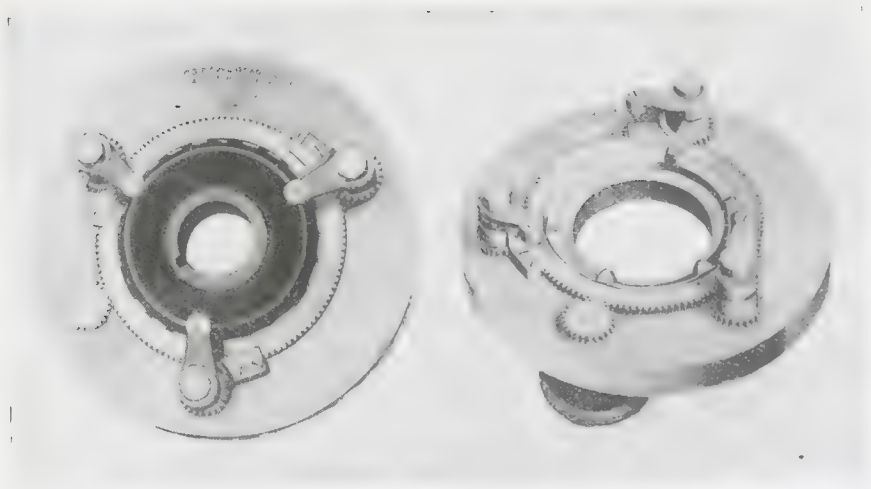
The machine is manufactured by the Reynolds Machine Co., Massillon, Ohio.

BEVEL GEAR CHUCKS

The illustration shows a new chuck designed by the Garrison Machine Works, Dayton, Ohio, for the holding of bevel gears. The gears are held by means of the chuck true with pitch diameter for grinding or re-machining of the holes or integral parts of the gears. The actual chucking time of a gear of 6 inch pitch diameter is only 5 seconds. No measuring, truing up, indicating, or experienced being required of the operator. A knob is turned on the back of the chuck after the gear is inserted in it and it is automatically located, absolutely located, absolutely true, and clamped up perfectly rigid without the least care or exertion. The design of the chuck is such that it is beyond the control of the operator to put any undue strain on any part of the chuck or any part of the gear being chucked. Neither is there any means of mutilation through the improper handling, unless it is de-



RADIAL SCREW DRIVING MACHINE



BEVEL GEAR CHUCK

liberate. The chuck can be applied to any grinder in the same manner and as readily as the ordinary 3 or 4 jaw chuck. These chucks are counterbored in the back to be located perfectly on the spindle. These chucks were designed owing to the insistent demand for a chuck which would be suitable for the holding of bevel gears, and were developed by the manufacturers through their making the Johnson gear chucks for straight-faced gears. The bevel gear chuck is as rapid and as simple to operate as the other.

DOUBLE SPINDLE SHAPER

The Oliver Machinery Co., of Grand Rapids, Mich., has invented a new and very useful as well as compact motor drive for double spindle shapers, using standard vertical motors.

As shown by the attached illustration a separate motor is used for each spindle. Each motor is mounted on vertical gibbed ways, adjustable by means of hand wheel and screw so that the motor can be located at any height desired shown by the scale as called for by the height of the spindle to suit the work.

Each motor stand is independently adjustable to and from the shaper to suit the length of belt, to allow the use of a straight vertical belt and to have means of taking up the stretch of belt so as to make belt tighteners and similar devices absolutely unnecessary.

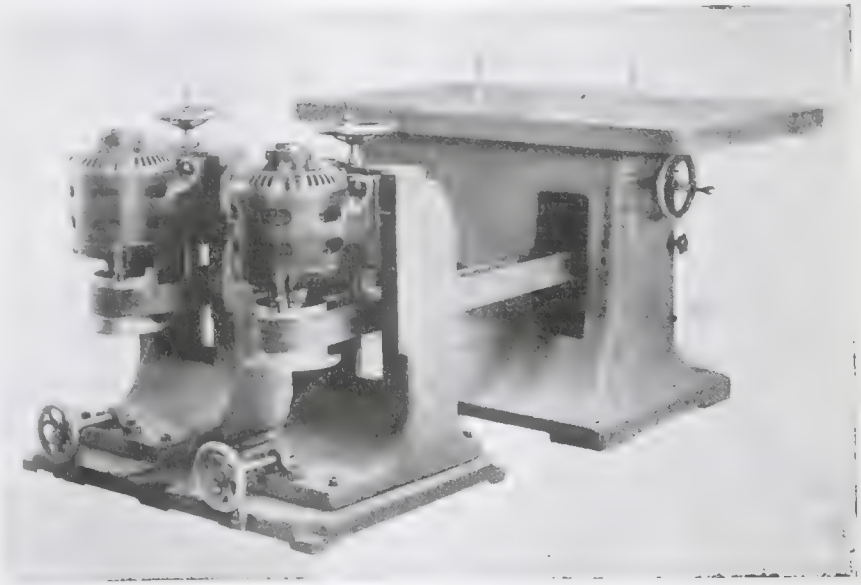
Either shaper spindle can be run independently by merely throwing out the switch for the motor operating the other spindle.

This new motor drive arrangement takes up far less room on the factory floor, because a distance of only 5′ between centers is required, making the actual floor space about 7′ long by 5′ wide, the only amount that is taken up by the machine.

This arrangement uses standard vertical motors of any kind as called for by the electric current in the factory doing away with the need of highly specialized built-in motors. This motor drive arrangement can be furnished not only with new shapers, but for shapers now in use. Any kind of starting units for the motors can be furnished.

The Chemical Catalogue Co., Inc., 1 Madison Ave., New York City, have issued the third edition of their chemical engineering catalogue containing 836 pages, 9x12 ins. The work is a book of reference for chemical engineers, buyers and others seeking information on chemical and and metallurgical equipment, machinery, chemicals and supplies. More specifically it is a collection of catalogue material and indexed data relating to the above subjects, and is the equivalent of a shelfful of miscellaneous catalogues condensed into a single book. It is published annually under the supervision of a committee appointed by the American Institute of Chemical Engineers, the American Chemical Society and the Society of Chemical Industry. The list of materials, equipment and chemical supplies is as broad and comprehensive as chemical science itself, and includes chemical engineering equipment and supplies, heavy and light chemicals, dye stuffs, alloys, ores, oils and raw materials for manufacturing industries. Two hundred and nine pages are devoted to a classified index of equipment and materials, and the variety of subjects covered is indicative of the enormous growth of the chemical industry in America during the past few years. The condensed catalogue section contains the announcements of the majority of firms either manufacturing chemicals or equipment for the chemical industry including the scientific and laboratory apparatus required for the accurate control of industrial processes. The chemical and materials section includes the principal manufacturers and important handlers of heavy and light chemicals, dyestuffs, adhesives, oils, alcohols, starches, soaps, sizings, ores, alloys and raw materials required in the various industries of today. In this edition a technical book department has been added at the request of a large number of users of the catalogue. The list gives selected titles on technical and scientific books bearing on the chemical industry and related branches of engineering, arranged alphebetically under the author's name. The author, title of book publisher, and price are given, as well as a synopsis of the contents. Those desiring to obtain can order directly from the Chemical Catalogue Co. and the books will be sold at the publishers' price. A copy of the Chemical Engineering Catalogue will be lent, without charge, for a period of one year to any chemical engineer, chief chemist, industrial plant superintendent, works manager, buyer, or head of a chemical department in a university or college. On the issuance of a new catalogue the old one will be recalled and the new one substituted. To others than those included in the above classification the charge is $5.

Halifax, N.S.—The "Olympic," of the White Star line, left Halifax on her return to England on December 21. She carried among her passengers Admiral Chambers, of H. M. Dockyard, Halifax, and a number of naval officers and other ratings.



OLIVER DOUBLE SPINDLE SHAPER

BEST WAY TO DEAL WITH THE WAR MACHINES IS BEAT 'EM INTO PLOWS

By WM. EARNEST

THERE is a good deal of babble going on these days with regard to the disposition of machinery, now that the war is over. Many suggestions have been made, which show real sense in some instances, and in others a real lack of appreciation of the business end of the deal. It has been suggested by someone that the Government take upon itself the task of storing all this war machinery as a preparedness measure.

This reminds me of a chap I used to know who achieved considerable fame in our locality in the horse dealing profession.

Having been a down-and-out at one time, and after connecting himself with a religious body, cutting out the booze, etc., he straightforward went into the carting business. For the nominal sum of twenty-five beans, this worthy gent bought an old plug of a horse that had been, at one time, years ago, the mainstay of a coal and ice firm, and also an old pair of sleighs.

All the townspeople were delighted to see our friend's conversion, with the result that business boomed. The poor old plug worked six days a week and overtime, and would have worked on Sundays but for obvious reasons. However, the end to this state of things came at last, followed by evil days, and the poor geegee developed a bad case of heaves. Now, our friend was, let it be understood, first and last a business man, and at the psychological moment — this being Spring time—charitably renounced all rights vested in this blessed beast, by driving home a deal, for the princely sum of one dollar, with a widow woman who ran a truck garden. As a result, the good woman got a whole lot of Spring plowing done cheap, but that was all, for the old brute passed to the great beyond before all the snow had gone from the fence corners.

Being, as I explained before, essentially a business man, our old friend the carter paid a second visit to the dear widow lady, and after extending sympathy, offered to dispose of horsie free of charge; but I might explain, that this act of generosity was only committed after an interview with the manager of a local tannery. This is about how matters stand with regard to the Government and all this machinery. Whilst not trying to slam either Government or manufacturer, is there not somewhat of a parallel with our carter friend? Take for instance the manufacturer: After proving his ability to make munitions, he receives lucrative orders from the Government, after which he purchases machinery, good, bad, or indifferent, much of it of the single purpose type, and sallies forth to achieve records, and incidentally make good profits.

Now some, foreseeing that the business had got to end sooner or later, got rid of all they could do without before the final reckoning came, and very wisely so, for many a small manufacturer got his "spring plowing done," so to speak, and made quite a profit from the old machines, and in a few instances some charitable junk dealer would cart the last remains away.

Now that we have won the war, and above all things we hate to anticipate another, I should think the Government will not be out to buy dead horses.

The best thing to do with this bulk of metal is to figuratively beat it into ploughshares. If perchance another war comes, we will be equal to it, for after all, has not the glory of the war been in the fact that we have triumphed over seeming impossibilities, for a righteous cause?

Bringing the matter down to a dollar and cent basis, what is more valuable to a good going concern than a miscellaneous scrap heap? Of course, much machinery will be really useful for years to come, but not the single purpose kind. However, take one of these machines, and analyze the make-up thoroughly. First of all, there are many bolts, screws and washers, and standard pieces, that any manufacturer may put into his storeroom and save that much. Then babbitt bearings, if any, would save the purchase of new material. Much steel also enters into the construction of these machines, much of which is quite capable of being easily cut up into gear blanks and a hundred other small parts. Then another item is the bulky casting that constitues the bed or body of this equipment, which is about the worst proposition to cope with. There is much cast iron that could be used for jigs, fixtures, etc., with a little extra machining and thus save the cost of patterns and molding. Shafting, pulleys, and other material can, if manufacturers keep in mind the "single purpose" idea, be utilized very profitably in the future in various machines of their own invention, with little outlay for labor on the same. If this course is adopted, all this material will soon be "butchered up" beyond recognition, and be profitably used to good ends. One thing is certain, that if any attempt is made to truck and trade in this line of goods as useful machinery, bulky as it is, with freight rates so high, someone is going to be stung, and as is usual in most things, the man who handles them last will lose most.

FUTURE OF BRITISH SHIPBUILDING

In the course of his presidential address to the North-East Coast Institution of Engineers and Shipbuilders Mr. Edwin L. Orde discussed the question whether our shipbuilding and marine engineering industry is to be remodelled in the direction of bulk production, or by the highest possible development of pre-war methods and practices.

He remarked that fabrication, a word which now enjoys a happier reputation than was its lot a few years ago, has been adopted by so many writers and speakers on shipbuilding subjects that it may be taken to have earned a place in our elastic and not very precise shipbuilding vocabulary. It is understood as meaning the building of parts of ships in one place so that they may be erected in another. How far is this process likely to increase the rate of production in this country?

The ideal shipbuilding establishment for rapid and economical production would be a long strip of ground with coal and ore mines, steel works, rolling mills, engine works, and shipyards all arranged under one roof at such short and convenient intervals as to permit continuous progress from ore to finished ship. But ideal conditions cannot be attained or even approached by adapting to new methods appliances and facilities which have been designed for, and fulfil more or less satisfactorily, another set of conditions, so that new shipbuilding yards seem to be essential to the scheme. The lay-out of these yards should provide for the even routine passage of the various parts from the fabricating to the shipbuilding establishment. How far can these conditions be fulfilled in this country? Sites for shipyards at comparatively short distances from the sources of the essential materials may not be difficult to find; it may be possible to arrange marshalling yards at the rolling mills, fabricating works, and shipyards on such a liberal scale as to produce an uninterrupted flow of parts; but when all this has been done, has any great advance been made in economy or rapidity, or both? The economy of the system depends almost entirely on the distances that separate the rolling, fabricating, and erecting plants. When, as in America, these are long, the large reduction in the weight of the material after fabrication may, probably will, effect a saving in freight more than sufficient to cover the cost of the extra loading and discharging. Rapidity depends on two factors, which are to some extent opposed to the usual restrictions under which shipbuilding is carried on in this country—(1) a very large supply of semi and unskilled labor; and (2) a railway organization which will secure the constant transfer of fabricated parts with mechanical precision.

The important conditions that affect the standardized fabricated ship may be indicated by a few questions. How far can bulk production of ships and engines meet (a) the immediate requirements for tonnage, and (b) the future developments of shipping? and how far can it be reconciled with (c) the apparent desire to shorten the hours of labor, and (d) the aspiration to raise the intellectual standard required of labor in industrial process?

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Help This New Feeling Along

THERE is undoubtedly a new feeling arising in regard to the conditions that should exist between capital and labor. In fact, the new feeling is such that it will likely put the boots to that phrase "capital and labor."

It's a poor phrase at best. It draws a line right at the starts that hurts insteads of helps.

It survives the old days when the man in the office looked upon the man in the shop as the human part of the machine.

There has been a wonderful softening influence in the last few days and years.

The son of the man in the shop has gone under in France, and the son of the man in the office marched away and will not return.

The employer who has had much to do with turning out munitions in the last three years in Canada has learned that it is good policy for the people in the shop to make good wages.

An employee who is making good wages is likely to be contented. The employee who is kept down to the lowest possible wage is not going to be contented. He will quit just as soon as the chance comes, or if he stays he will be looking for a chance to strike.

It is only human nature. In these days of living at its highest point, with the purchasing power of a dollar shot to pieces, the man who cannot provide for his home in decency is going to listen hard to the doctrines of Bolshevism. He will become an agitator, whereas decent conditions and a square deal would have made of him a good citizen, and of his home a centre for good influences in the community.

Manufacturers are realizing this point. They are speaking of it openly. They have had a demonstration of the fact that good wages and good conditions will iron out more trouble in the shop than all the deputations and labor departments in the world could ever hope to do.

It is well that this feeling should start now and grow with the new industrial Canada that is coming. Encourage it. See that it gets a chance to develop. It will do more to prevent strikes and lockouts than all the legislation that could ever be piled into the books of the country.

The bigger the margin that can be maintained between the worker and starvation the greater the efficiency of the worker and the success of the concern with which he is connected.

Reporting the Peace Conference

NEWSPAPERS from this continent are sending some 1,500 correspondents to "cover" the peace conference in Europe. No doubt each and every one is going over primed with the notion of writing a story that will set the people by the ears.

There's nothing now to hinder them scribbling away as hard as they please. They can blaze ahead and burn up the heather in advance, but the wild scramble is yet to come. When the conferences really start in earnest there will be a demand at home for cabled stories at the close of each session.

Remember, there are some 1,500 correspondents. After official and commercial business for the day gets off the cables there are some half dozen wires open for the correspondents. Of course correspondents, like reporters, are apt to stand aside and beg of their rivals to step in and send their stories first.

It looks from here as though these 1,500 correspondents with six wires amongst the lot would be sufficient to start the war all over again.

Here's a New Election Card

ABOUT this time of year a person's apt to hear quite a heap about the candidates who run for office in the municipal field.

If a man's had a shady chapter in his history he can take it for granted that by the time he's been in the field for a month or so that the shades will be a hang side darker than his most active conscience ever thought possible.

The election cards and appeals are, as a rule, the finest collection of junk that one could well imagine. They are no humble recital of the fact that "I have left undone those things that I should have done."

They, at times, speak of the "best interests of the city." In fact an election card that can't warm up that phrase a couple of times is about as flat as the day when dad leaves the salt out of the oatmeal mush.

But there's one chap running for office in Guelph this year who is out to blaze a new trail. They're trying out a new system in that city this year. Instead of electing a mayor and council—12 in all—they have 18 running for aldermen. When this dozen and a half are elected they all jump into the hopper and fight it out for the mayor's position, and may the best man win.

But this one candidate in particular, Lane by name has an election card in print that reads thusly:

WHO'S
LANE
Never Mind Who He Is
VOTE
FOR
HIM

Never mind who he is. Vote for him. Well, it may be that every person in that agricultural hub knows who Lane is, and that it's not such a genuine game of blind man's buff as might appear on the surface.

But for the man who's on the outside looking in it surely does look like a brand new era in civic politics. "Never mind who he is. Vote for him."

How could a man have a Merry Christmas wearing the necktie his mother-in-law gave him, and smoking the cigars of his wife's selection?

President Wilson is having the time of his young life in London. In fact for a democratic President he's taken to the ways of kings and queens in remarkable style. It may be that they'll have him dressed in knee breeches with silk stockings before he gets away from "Lunnon."

Speakin' of Dancin'

When I was young we used to like to have a good old dance—and see the folks enjoyin' it, and watch 'em jump and prance. And when some chap with slippery feet could do a buck and wing—we used to think that that there jig was one spektac'lar thing.

And when he'd get up on his toes and then pound with his heels, it used to rouse our dancin' blood until a person feels like keepin' time and joinin' in and shakin' up the dust, and keepin' all yer joints and limbs from gettin' touched with rust.

But nowadays, we see a show, and, land, all things are new; they can't go poundin' with their feet like what they used to do.

They get pianers on the stage, and then they get some chairs, and the man what runs the orchestra turns on some dreamy airs.

And then the folks begin to dance—they're stripped for action, too—to wear less duds than them there folks, good grief, 'twould never do. They slide around the pianer stool and hurdle o'er a chair, and go awaltzin' by themselves as though they didn't care.

They slide like Kelly for a base, they swing their fists around, then put their feet up in the air 'bout ten feet from the ground.

And then they circle round a chair in steps like turkey trot, and jump as though they took a bite of taters good and hot. They chase each other round the ring, these flimsy dancin' dames, and try to land their hoofs, by heck! right through the picture frames.

Perhaps I'm ancient in my views, likewise backwoods and rough—or else I'd sit admirin' this new fandangled stuff.

Give me the fiddler who can squat upon the kitchen chair, and rasp "The Turkey In the Straw," that grand familiar air—and who can yell a square dance through and fiddle quick and deft, and shout, "Now grab your partners and swing 'em right and left!"—ARK.

In an interview given the representative of the United Press by Mr. Hurley, chairman if the Shipping Board of the United States, he declared that the American Merchant marine flag must fly in every corner of the world. He announced that the United States would soon be able to build ships as cheaply as England. In addition to this the American merchant mariners would all wear uniform, and have fine living quarters. Mr. Hurley did not say if they were to have a gramophone for every two men, or one grand piano for the whole crew, but these details will no doubt be worked out later. It is expected that when the scheme is worked out thoroughly American ships will carry two crews, one to uphold the dignity of the American sailor, and the other to work the ships. The mere fact that all sailors will be uniformed will be enough to eliminate competition from ships with non-uniformed crews, as we cannot conceive of anybody shipping goods without the protection from damage conferred by the wearing of the official dress. Perhaps Mr. Hurley is influenced by the sentiment of the old song which says, "I Knew He Was a Sailor 'Cause He wore a Sailor Hat."

GAS WELDING FOR BOILER TUBES

"Bagged" and leaky boiler tubes may be repaired by oxy-acetylene welding. As many as fourteen welds have been made in one tube before discarding the latter. The "bag" on the tube is heated slowly by the torch until it is a bright cherry red and then driven back, beginning at the edges and working towards the centre. The leak, if any, is first welded up. Sections of sound tube are welded on to damaged tubes. Including labor, material, and cost of setting up, the total cost is about 75 cents per weld. The oxy-acetylene torch may be used to anneal crystallized tubes.—Electric Railway Journal.

USE FOR OLD FILES

Economy in the use of materials will claim attention in the future. Worn-out tools will not in all cases find their way directly to the scrap heap. Files, for example, which are made of the best crucible steel, when no longer serviceable as files, may, with very little alteration in form, find new uses in another category of tools.

Flat files of all sizes may be sharpened and used as chisels; triangular files may be easily converted to centre-bits. The flat file needs but little labor expended on it to make it an efficient screw-driver. Though not always necessary, it may be desirable to grind the face of the file smooth, mainly for the sake of appearance. In most and cost of setting up, the total cost is about 75 cents per to make the change of form easy. For this, heat to a dull red and allow to cool slowly. When formed, the new cutting edge may be again hardened to suit the use for which it is intended. For tools other than files a secondary use may be found with very little trouble for their conversion

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LEAD-WOOL FOR CAULKING GASPIPE JOINTS

Gas engineers admit that about 6 per cent. of the gas manufactured is lost through leaky joints. The Detroit City Gas Company have carried out a series of experiments to test the merits of various materials on the market for caulking cast-iron pipe joints. The most interesting fact developed was the strength of a lead-wool joint. The difficulty in breaking the joints led to the belief that cast-iron pipes could be caulked alongside the trench and lowered in without disturbing the joint. This was tried on 16-in. pipes, and three lengths at a time were successfully handled in this way. In making a joint with lead-wool, the jute is first driven in as tightly as possible, then the lead-wool, rope by rope. Each blow upon the lead expands it in the pipe and at the same time drives back and holds the jute so that the lead completely fills the lead space. The result is a joint that can shift several inches without leaking.

Racey, in "Montrea. Star"

DROPPING THE PILOT

MARKET DEVELOPMENTS

Marine Work Helps the Situation Now

Contracts Placed For Equipment of a Number of Small Ships—Plate Contracts Here Are Based on the U.S. Base Price of Three Cents, Which Seems Likely to Hold Until July

THE placing of contracts for equipment for a number of small French vessels is keeping a number of shops and warehouses fairly well supplied for the present. Marine activity is just now responsible for the largest part of the business moving in supplies and raw materials. The completion of the contracts will call for a fairly large quantity of plate, boiler tubes, marine forgings, etc. Nearly all contracts that are quoted on now for plate are on the 3c base price. The chances seem to be that this price for plate will stand until July of 1919, after which there may be another alteration, depending on the response that the 3-cent price has brought. The pre-war base price was $1.40, so there is quite a margin there yet, but one that will not be entirely taken up unless all signs fail. Students of the situation look for a recession from the three-cent rate, claiming that the market will eventually find its level around $2.50, below which they do not look to see it go.

Several manufacturing concerns have pretty well defined ideas regarding the plans they intend to follow for after-war work. They are not making many announcements yet for several reasons, the principal one of which is that they do not wish to invite competition in the lines which they are investigating at their own expense.

The scrap metal situation remains in the same position, one very close to stagnation. As has been stated for several weeks past, there is no scrap metal market now that will furnish an accurate idea of the trading values of the different lines. Unless some person wants to sell at a suicidal price dealers are not going to come into the market to buy. They are advising those with whom they do much business to hold their material until there is some improvement in the situation.

There has been no drop in the price of high speed steel supplies. During the war there was a great demand for this for munitions work, and standard lines were neglected. Some dealers have large stocks of special shapes in stock which will be useless, as there is no other operation requiring such a fixture.

STEEL OUTPUT MAY TAKE DROP UNTIL THE SPRING HAS ARRIVED

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Jan. 2.—Practically all branches of the iron and steel market have been very dull, if not stagnant, with the exception of sheets, in which line there has been such a demand, chiefly against old contracts, that the mills expect to be able to operate at about 85 per cent. of capacity during January.

The past fortnight has not, of course, furnished any rigid test of the market, because the market is always quiet over the holidays. Buyers have been busy with inventories and various other accounting affairs and would hardly figure in the market no matter what the basic conditions might be. The same condition normally obtains during the first fortnight of January, and thus the real test of how active or quiet the market is going to be for a while will come after the middle of the month.

Finished steel prices are quotable firm at the recent reductions, which averaged about $4 a net ton, considering that while the reductions were fairly general they did not include wire products. The reduction was, of course, a very small affair, considering that the Government prices were about $40 a ton above the average prices quoted during the ten years before the war, 1904 to 1913 inclusive. It is clear that the reductions are a factor chiefly by way of furnishing a basis on which invoice prices can be adjusted when shipments are made under old contracts, such as tacitly or by specific arrangement involve a guarantee against price decline.

Pig Iron Prices Are Firm

Pig iron prices have not come down to any extent. It will be recalled that the steel price reductions occurred after the publication of a schedule of reductions that had been prepared on the basis of their being submitted to the War Industries Board December 11, but which the board refused to consider as it did not intend to set any prices for the first quarter of the new year. That schedule included a blanket reduction of $3 in pig iron. No general reduction has occurred. Some of the Alabama furnaces have reduced prices $3 a ton, to $31, Birmingham, for No. 2 foundry, but that does not mean that northern iron in general has any occasion to come down from $34 at furnace, when the freight Birmingham to Pittsburgh is $5.70 and to Chicago $5.00. A reduction in the Ironton district will probably be forced, however, by southern competition, freight to Cincinnati being $3.60 from Birmingham and $1.80 from Ironton, so that Ironton would have to come down to $32.80 at furnace to equalize at Cincinnati with Birmingham at $31. Some resales of iron are being made in this territory at various cuts, usually $3, but such transactions can hardly be regarded as making a reduced market, since in many, if not all cases, the iron is being sold in order to have the loss fall before January 1, when inventories must be made up and with no open market to make an inventory price below the Government level it is better to get the loss established at once, since taxes for 1918 will doubtless be higher than for 1919.

Cycles of Activity

Generally speaking, the iron and steel market, despite the fact that the occasion is the ending of the greatest war in history, is in much the same position as has existed at the close of every period of great activity in the past. There was the "boom" of 1899, with a collapse in 1900, the activity beginning late in 1901 and lasting until early in 1903, with dull times thereafter until late in 1904, the protracted period of activity lasting until nearly the close of 1907, with very light demand thereafter, while the "Gary dinner movement" held prices fairly well until buyers were ready to take hold again in a large way, the rise of 1909, with very slack demand in 1911 and finally the rise of 1912, which kept the mills busy until the latter part of 1913, when buying became light until in 1915 the war demand took charge of everything.

In all these cases buying had run its course, and buyers even for moderately early delivery were not willing to take hold, while investors, those who engage in works of permanent construction, were absolutely out of the situation, waiting for more settled and promising conditions. In each instance the blast furnaces and steel mills had large quantities of contract business on books, and by maintaining prices they could squeeze a great deal of tonnage out of these contracts, while by letting the market break they would book very little business as everyone would be all the more disposed to wait for the bottom to be reached. In all these historic cases the deliveries on old contracts greatly exceeded the new buying, and when the contracts had been worked to the limit and at the same time it looked as if a fresh buying movement could be started, prices fell, a bottom was found, and then recovery started, each price advance encouraging buyers to take hold still more freely

Labor Efficiency Is Low

There is no particular reason for supposing the general order of things will be different at this time, except that there are more readjustments to be made before investors will be disposed to take hold. The reference is not to steel prices, as the steel mills would meet any situation as presented and would not hold prices up if they saw they could do more business by reducing them The reference is rather to the general prospects for investments, in bridges, buildings, hydro-electric development projects and a wider range of construction jobs, and also to the cost of carrying through such projects. No matter what the cost of the steel, it costs money to put it into employment, and the investor considers the cost of other building materials that are needed besides steel, as well as wage rates and the amount of labor one gets by paying for an hour's time or a day's time. It is generally asserted that at present labor efficiency is very low. That must be adjusted even if wage rates are not going to come down, but there will probably be some declines in wage rates on construction work, though it seems unlikely that there will be any general reduction in basis wage rates in the iron and steel manufacturing industry proper.

The trade is rather optimistic, and looks for a period of great and protracted prosperity, to start in the not distant future. The common guess, when one is made, is that this will start "in from three to six months." This means that April, being a spring month, is a favorable time for construction jobs and other undertakings to be inaugurated, and that if things do not open up in the spring expectations must be deferred over the summer until September or October. Meanwhile it is a question whether the mills will be able to keep up their present rate of operation, since some of the demand now being experienced is by way of the accumulation of wants during the period of steel delivery restrictions. This may possibly be worked out in a few weeks to such an extent that the mills may drop to a 70 per cent. or even a 60 per cent. operation. There might be an accident and a break in the market, but the mills would hardly be disposed to reduce prices merely because they were operating light; they would have to see that reducing prices would stimulate demand. Just now reductions would not act as a stimulus.

POINTS IN WEEK'S MARKETING NOTES

Contracts for small French vessels placed in Canada are making—business better for some of the shops and a number of warehouse interests.

Estimates for steel plate being made on Canadian contracts now are at the U. S. base price of 3c per pound. This price will hold until July in the belief of the steel group. A slight recession may take place then but not to the pre-war level of 1.40c per pound.

Scrap dealers state that there is no improvement in the situation, and that they are not buying anything unless it be at very exceptional prices.

Advices from Nova Scotia show that the impression prevails there that there will likely to a falling off in the production of steel before buying becomes active enough to help the situation to any great extent.

Contrary to expectations there has been no drop in the price of high speed steel goods. Standard lines had been neglected while the rush was on for munitions factories. There is no other use for hobs, chasers, and some of the boring tools.

A number of Canadian firms have plans well under way for the bringing out of new lines. At present they have nothing to say of a definite nature, as in most cases they are not ready to go ahead.

LITTLE BUSINESS MOVING THIS WEEK

Dealers Getting Things in Shape for the 1919 Selling Campaign

TORONTO.—The week between holidays has been quiet. Little business has been moving. Dealers are just clearing up orders on their books, and making certain that business they are carrying on as good is still in that class, not having been rendered useless by the passing of munitions manufacturing.

Machinery Trade Quiet

Dealers are engaged in many cases now in getting their statements of the year's work in shape, and in otherwise getting things in shape for the work to be undertaken during 1919. Several conferences have been called of selling forces to be held during the week when plans will be made for the campaigns in the coming year.

Prices of high speed lines do not show a tendency to come down, although it might have been supposed that following the war work the prices would take a slump. High speed steel was much in demand when munitions making was the big item, and a large amount of this material was turned into special fixtures that are absolutely useless now, as there are no commercial operations that call for the same operation. Some of the supply houses have quite a lot of this stuff on their shelves—too much in fact. The way in which special designs were turned out meant, in many cases, that standard lines were not looked after as usual, so it is likely that just now there is not an over-supply of the material on hand.

Marine Work Helps Now

Contracts that are being let by the Fabricated Ship Corporation for orders for the French Government are helping to keep business brisk in marine lines. There are some 38 of these vessels in all, and warehouses report that there is, in consequence, quite a demand for plates, boiler tubes, marine forgings, etc. Some of these contracts have been definitely placed, and orders are following for the filling of them.

Plate for these contracts is being quoted now at the base price of 3c at U. S. points. This price, it is thought, will hold until July of 1919. It is pretty well in the hands of the U. S. Steel Corporation to make or unmake the price, and there seems to be small chance of any reduction before July. When

July comes one guess is about as good as another as to which course the prices will take. Some who are quite closely in touch with the situation claim that the base price of steel is likely to work below the 3c mark, probably finding its level around the 2.50 point. As a matter of fact it can be recollected that at the start of the war the base price at Pittsburgh was down around $1.40 per hundred pounds.

Some of the dealers report that there is a fairly good demand apart from marine activities. Plenty of business is in sight, was the opinion of one house, adding that the present was hardly the time of year to close it up.

Scrap Market the Same

Prices quoted elsewhere in this paper do not represent buyers' prices, although they are supposed to. It was suggested to one of the dealers this week that a corrected list should be used, and the answer came like this: "How can we correct the list when there is nothing to go by. We are not buying, so how can we name the price at which we will buy. Copper is still down at around 24c, while Montreal has the price as 18½c. As a matter of fact we do not want to take any into stock at either price, so one might just as well stand as the other." Dealers do not know what is going to be done with the scrap that has accumulated in such large quantities. A New York report, speaking of scrap, says:

A factor for weakness in the present market for heavy melting steel is the possibility of heavy tonnages of shell steel being offered for resale as scrap. A lot of 20,000 tons has just been offered in this market by a Canadian munition maker, and similar large tonnages are expected to come out in this country as soon as cancellations become more fully adjusted. Although billets and some other such material may possibly be brought into competition with products of the mills, it is believed that much of the shell steel will undoubtedly be sold as scrap. It appears the Government probably will act as selling agent in many instances, the difference between the original cost of the material and the selling price being refunded to the shell maker. The Government is offering 1,210 airplanes and 2,000 airplane motors for bids Feb. 1.

SCOTIA REPORT LOOKS FOR A SLACKENING OF STEEL PRODUCTION

Special to Canadian Machinery.

NEW GLASGOW, Nova Scotia, Jan. 2. —The probability of a slackening in demand for steel products is becoming clearer, and within the next few months unemployment affecting a large number of men seems tolerably certain.

A vague impression has been abroad that a demand for steel materials for reconstruction work in Europe would help out the steel situation on this side of the Atlantic, but there was never any real justification for this impression. In the first place, steel is not largely used in building construction in Europe. Buildings of the sky-scraper type are the exception in Europe, and the use of rolled shapes and what is known as structural steel is very limited on the other side. The conditions under which the Armistice was concluded has also resulted in very much less damage to the occupied territory of Northern France and Belgium than at one time seemed possible. The totality of actual demolition is confined to a comparatively narrow area, and the small amount of steel that will be required to repair the damage in this area can easily be supplied by Europe itself. It has not been realized how tremendous has been the increase in Britain's capacity for steel production, and now that both coal and iron deposits are freed from the grasp of the German, France and Italy can both make notable contributions to steel manufacture. The same is true of Belgium, where, by a modern miracle, the complete destruction that was once threatened has been in large part averted.

The Real Situation

There will be a remarkable change in the attitude of all the Entente Nations towards future industrial expansion. France, now once more in possession of her Lorraine ores, freed from the nightmare of the Westphalian monopolists, and assured of national boundaries that will give her commercial strength just as assuredly as they will diminish the commercial strength of Germany, and strengthened in the world's esteem and her own by the manifestation of financial strength and military potency that the war disclosed in her, will enter upon commercial activities with renewed aggressiveness and resources. The industrial renascence of Belgium will be not less remarkable. Britain has discovered unsuspected possibilities for production within her own borders, and it is not probable that she will allow herself to be relegated to third place by German production of coal or iron, as had happened before the war.

While the tremendous production of coal in the United States presents a new world phenomenon, yet it should not be forgotten that Britain, next to the United States, is the largest producer of coal in the world.

Room for Machinery

Generally, there seems to be very little real basis for anticipating large future shipments of steel products to Europe. There will be, as there has been, a large market in Europe for American and Canadian machinery and harvesting devices, but no one has yet made it very clear why there should be any large shipment of steel in the shape of billets, rails, structural shapes, etc.

There may be a permanent market on this side for grades of steel that were once the peculiar product of Europe, such as high grade crucible and tool steel, which are now being manufactured on this side, in many instances by branches from European houses.

There has been a significant growth in the manufacture of fine cutlery in the eastern portion of the United States, but so far no particular advantage has been taken in Canada of a very obvious opening for the manufacture of high grade cutlery in Canada.

Very few people, except possibly those who hailed from Sheffield and were cranks on the subject of German cutlery, were aware of the tremendous hold that German cutlery had on Canadian markets. Many people were genuinely under the impression that Boker goods were British made, largely because this astute German house enclosed their knives and razors in a paper covering which stated them to be made from Sheffield steel. They were made in Germany nevertheless, and on the whole they were goods of excellent quality, admirably adapted to suit Canadian ideas, even to the adoption of such names as "Strathcona" on hockey skates. Even in houses in Montreal, whose chief boast is that they are branches of famous English concerns in the cutlery business, would offer customers German made scissors and manicure implements. In the majority of Canadian hardware stores, it was before the war, and still is extremely difficult to obtain a "Sheffield blade." The gap in supplies from Germany has been filled by American cutlery, which is usually good, and by Japanese cutlery, which so far is generally bad. There is an obvious opening for Canadian enterprise in the cutlery business.

The main hope of the Canadian steel producers is in the supplying of railway equipment, namely, steel, rails, fastenings, spikes, and freight car and rolling stock parts. Shipbuilding is the other possible outlet, but if the Government has anything to give out for either railway or shipbuilding purposes, now is the time to do it, because serious and grievous unemployment is imminent otherwise.—F. W. G.

The Scrap Market.—Speaking of conditions in the scrap market for 1918, Frankel Bros. at Montreal report: "While there has been a large volume of business, profits have only been nominal, owing to fixed prices of raw materials by the Governments. The war has effected great changes in different markets, and the sudden post-war period will introduce problems which we can, however, overcome. At the present time the market is practically at a standstill, owing to the vast change which is taking place, but it is our candid opinion that before very long confidence will again be restored, and that we will see considerable activity. While we cannot predict the future, we may say that we are in receipt of inquiries from several large consumers, for material to be delivered early in 1919."

HAVE NOT YET REACHED THE BOTTOM OF SCRAP METAL PRICE

Philadelphia.—Making deliveries on contracts and chiefly on those of recent date constitute the principal activities of scrap dealers here. Mills are expected to cancel the undelivered balances of contracts recently placed at the end of the year. There are a good many contracts for heavy melting steel at $21 to $23, and dealers are in the hope of completing these without much loss. The belief among dealers is that a buying movement is due in about three months from now, as they feel that a settling of the scrap market will come much sooner than in finished iron and steel.

Chicago.—Further declines of $1 to $2 per ton were noted at the beginning of the week, showing that in spite of the heavy declines already registered, the lowest level has not yet been reached. There is no scrap remaining at the former Government level, and the general level is far below that of a month ago. Owing to reduced operations at the plants of some of the consumers their need for scrap has been reduced also with no consequent effect on the market. There are practically no consumers in the market. Chicago, Minneapolis, and St. Paul offer 400 tons, and the Kansas City Terminal offer 200 tons.

Pittsburgh.—There is no evidence of change in the scrap metal market here. Dealers are confining their attention to getting their shipments for the contracts which expire at the end of the year. There is some steel coming from shellmakers who have had contracts cancelled, and rejections of shipments of iron on contracts are also reaching the market. There is some demand for this from dealers who are short on contracts, and they are picking up supplies at considerably less than Government prices. The market is normal, but with a rather weak tone. Bundled sheets are bringing a maximum price of $27 delivered, while stove plate is bringing the same price as heavy melting steel, and the top price on heavy axle turnings seems to be $22, delivered. Low phosphorous steel is quoted around $37, but there are more sellers than buyers at that price.

New York.—Prices are still on the decline here, with the market practically at a standstill. Heavy melting steel is down to $18, New York, and this price could be lowered still more on a good sized order. Prices for borings and turnings hold fairly steady, and they seem to be the only materials that are doing so. Cast scrap is quoted at $27 to $28, and grate bars at $21. A lot of 12,000 tons was recently disposed of by the Pennsylvania Railroad, most of which went to one dealer.

Buffalo.—Prices on practically every grade has dropped about $2 during the past week, and there is no buying movement expected before the first of next month. Consumers evince but little interest in scrap, being mostly engaged in taking inventory. As there are no large stocks on hand anywhere, prices are bound to strengthen on any buying movement of respectable size.

Cleveland. — Market quotations are mainly unchanged, and what there are are nominal, as there is no trading. Dealers are inclined to fight shy, as they feel that the conditions are such that the less scrap they handle for the first six months, the less chance they will have of losing money. There are no consumers in the market, while some dealers are picking up a little scrap here and there for their yards. Some steel was offered to consumers here this week by Eastern dealers at $26, but was not taken up. Borings are keeping close up to the prevailing Government standard, some contracts being closed for first quarter contracts at the last Government quotation.

Birmingham.—Except on old contracts, busines is at a dead stop here. Orders placed some time back have not all been cancelled, and the consumers are taking their supplies steadily, which is gradually cleaning the yards out. The scrap market is very weak, and published prices are not being realized in trading.

St. Louis.—The situation existing here is one in which there are any number of sellers, but practically no buyers. which has brought about the inevitable result, prices being still on the decline. The market has never known anything like the sensational break experienced during the last six weeks. The leading rolling mill interests are out of the market, being under embargo, and the National Enamelling & Stamping Co. are experiencing labor troubles, which has removed them temporarily from the market. There is some difference of opinion as to the outlook, some members of the trade thinking that the next couple of months will bring more stable conditions, while others think that at least six months will elapse before that desirable condition is realized. There is not a large total amount of scrap in the country, and the break is ascribed more to a lack of buying than an overabundance of material.

Cincinnati.—The market is quiescent, waiting for the year to end and the new year to begin. Scrap dealers are having a little trouble on cancellations, though most of these have been disposed of. Dealers who take small lots from the small collectors are taking what comes along, but are advising their small collectors to take a holiday till after the new year. There have been no cancellation orders turned in from steel mills.

HAS MANY INTERESTS IN EASTERN CANADA

Stanley E. Elkin, M.P., Has Been Appointed Director of the Union Bank

STANLEY E. ELKIN, M.P., manager of the Maritime Nail Company, St. John, N.B., who has been elected a director of the Union Bank of Canada, is only 39 years old.

Beginning his business career when he left high school in an insurance office. Mr. Elkin soon afterwards became purchasing agent for the Dominion Iron and Steel Company in Sydney. His next move was to Chicago, where he became assistant to the vice-president of the American Glue Company, during this period also acting as representative of a syndicate of New York bankers in Mexico.

STANLEY E. ELKIN, M.P.

In 1905 he established the Maritime Nail Company, Ltd., of which he is managing director.

Among his other activities are the following: President, Motor Car & Equipment Co., Ltd., St. John; vice-president, Wilson Box Co., Ltd., Fairville, N.B.; vice-president, Canada Nail & Wire Co., Ltd., West St. John; director, Nova Scotia Trust Company, Halifox; president, Rodstan & Co., London, England, and partner, St. Martins Shipbuilding Co., St. Martins, N.B.

Although entering the House of Commons only at the last general elections he was selected as one of the members of the commission to Washington to investigate the U.S. war organization and make recommendations to the Canadian Government.

It is the busy man often who finds time to do things, and during the recent Victory Loan campaign Mr. Elkin was the energetic head of the committee for St. John city and county, which rolled up a 50 per cent. surplus over its allotment.

FURNACES MAY BLOW OUT RATHER THAN PRODUCE AT NEW PRICES

THE recommendation of the American Iron and Steel Institute with regard to pig iron prices has not been received with unanimous approval by the Pittsburgh producers. While low cost furnaces can produce profitably at the prices arranged, some of the higher cost furnaces will be obliged to blow out, it not being possible to operate at a profit. If a condition prevails under which a number of furnaces are obliged to shut down, a falling off in output is bound to result, and as there is a marked shortage of pig available, this in itself would operate to bring prices back to the higher level. The following reports from points in the United States will show the situation in the pig iron industry.

Pittsburgh.—The feeling among producers here is that they will suspend operations rather than try and keep going at prices that show little or no profit. There has been no success so far of the endeavors to get the fuel administration to reduce the price of coke, the fuel administrator taking the attitude that since no more price fixing of iron and steel is to be made for the Government, he should not make any attempt to fix coke prices. Inquiries for iron are scarce, for buyers seem to be of the opinion that after the 1st of January they will be able to secure iron at a lower price than possible to-day. A sale of a small quantity of malleable at the new price has been reported for delivery after Jan. 1st, but enquiry for foundry No. 2 for delivery early in the year, elicited only an offer for the price that is to run to Jan. 1st. There has been some attempt to cancel unfilled operations of contracts, but the furnace interests are refusing to consider such attempts.

New York.—It is thought here that Eastern furnaces will recognize the prices agreed on by the committee of the American Iron and Steel Institute, and recommended by them to the price fixing committee of the War Industries Board. Developments are awaited in view of the fact that the price prepared for recommendation is merely a suggested level. It is felt that an adjustment from a peace basis of the market will ultimately result in the abandonment of Pittsburgh and Birmingham as bases for Eastern and Southern iron. The return to normal conditons should have an effect on the revision of the differentials for manganese, which, prior to the war, either did not exist or were much lower than the present ones. There are some hopeful developments in the Eastern market, some large consumers who were thought to be provided for their first half year's requirements being found to have only a couple of months' supplies. Some others, who were expected to have reduced requirements have sent in a hurry call for shipments, as they would have to shut down unless they got iron promptly. There are a good many enquiries for export in the market, though no eagerness to close them is shown. It is thought that a large amount of foreign buying will develop out of the needs of European countries whose iron making capacity is not as large as their steel making.

Philadelphia.—Pig iron buying has been halted by the recommendation for reduced prices, and no furnaces are offering iron at the new rates. In any case, most of the furnaces have such a large amount of orders on their books that they do not want any more at the present time. The large number of enquiries from Japan constitute a feature of the market, it being said that Japan needs 60,000 tons for immediate delivery. A permit to a Japanese buyer for 5,000 tons foundry iron for export was issued last week, and 2,220 tons for a Japanese consumer were allocated to Eastern furnaces at the request of the Emergency Fleet Corporation. Some Eastern furnaces are short of coke and cannot get any.

Buffalo.—Furnacemen generally are of the opinion that there will be a period of quietness till the spring, and that a great expansion will come then. The New York agreement for a reduction in prices meets with favor here, it being felt that it is a good move and will help to stabilize the market. There is not much business being done, as neither producers nor consumers are anxious to force the issue in prices for next year. The small amount of tonnage being dealt in is limited to delivery in the first half of the year.

Cleveland.—There has been one small sale at the new price of $31 by one of the makers in this district. There has been very little enquiry, and no particular wish to quote when there are enquiries, but there is no question that the new prices will be quoted for any business coming up for delivery after the 1st Jan. The question of whether contracts made for the first quarter delivery shall share in the reduced prices is occupying the minds of both buyers and sellers. Had the Government adopted the lower price as the official schedule for the first quarter, the buyer would have received the benefit of the reduction, and there is some feeling that the producer has a moral responsibility to give the buyer that benefit. There have been a few cases where small sales of iron for this year's shipment have been made on which the present fixed prices have applied. Allocations were brought to a close last week with 14,000 tons for Japanese interests being placed on the account of the Emergency Fleet orporation. The lots for Japanese export were foundry grade for prompt shipment, and were made at the present fixed price. With the week's addition, the total allocations for the period of the war amount to 2,000,000 tons, of which 1,965,000 was placed since 1st May.

Cincinnati.—The future market conditions are shrouded in doubt, and can only be the subject of speculation. There is nothing to show that the proposed reduced prices have been accepted, or that any iron has been sold below the maximum prices hitherto prevailing. Some small sales of high sulphur iron that does not figure in the regular price schedule have been made, but outside of these the sale of iron for immediate delivery has been stopped.

St. Louis. — Waiting developments after Jan. 1st seems to be the situation here. Buyers are not enquiring and sellers show no disposition to push sales. As most of the producers are sold far ahead, they can adopt an independent position, and leave the future to itself. Melters who have been in the non-essential class, are anxious to get supplies, but on the other hand are also waiting to get the lower prices, and in the meantime are waiting. Furnaces are not unwilling to book orders for next year, but they are not in the mood to grant any concessions, and are being governed in their commitments entirely by the matter of price.

Birmingham.—The situation here is such as to give confidence in the future. Furnace companies in the South have their books filled with orders, and more enquiries are coming in. There are a very small amount of cancellations on business allocated several months ago. Deliveries on foreign business that has been started since the armistice will be made at once, a good deal of it being shipped through New Orleans and other southern ports.
the last budget.

The Price of Copper.—The fixing of 23 cents a pound as the export price on copper by the Copper Export Association of the United States possesses significance for the Canadian industry. Such a course of action was not unexpected, since buyers have been holding off from making purchases at the fixed price of 26 cents a pound. Bids had been entered at 19 to 23 cents, so it is believed that producers and consumers came together to arrive at the final figure. Commissions representing foreign interests have been making inquiries recently in the United States, and the settlement of a price is believed to be a prelude to the transaction of considerable business with Europe. Price reduction has its bearing on the labor situation. Workers in the mines have been securing the benefit of a sliding scale, based on the price of copper. Prior to the lowering of the price they asked for a minimum wage based on 25-cent copper, and this was refused by the producers.

Want Tax Removed.—A deputation representing the organized automobile industries of Canada waited on the Government to urge the removal of the excise tax on automobiles. This is a tax of 10 per cent. on all cars imported or made in Canada, which was imposed in

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$32 75
Lake Superior, charcoal, Chicago.	37 50
Standard low phos., Philadelphia.	.....
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 40

Government prices.

	Montreal	Toronto
Hamilton	.....	.....
Victoria	50 00	

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Steel bars, base, Toronto	4 90
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	*2 90
Tank plates, Pittsburgh	*3 25
Structural shapes, Pittsburgh	*3 00
Steel hoops, Pittsburgh	*3 50

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

*Government prices.

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$ 29 00	$ 29 50
Electro copper	29 00	29 50
Castings, copper	26 50	28 50
Tin	80 00	83 00
Spelter	9 50	11 00
Lead	9 50	10 00
Antimony	11 00	16 00
Aluminum	43 00	50 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 8 00	$ 7 00
Plates, 3-16 in.	8 50	8 40

WROUGHT PIPE

Price List No. 37

Standard Buttweld

	Black	Galvanized
	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	5 22	7 35
⅜ in.	5 22	7 35
½ in.	6 63	8 20
¾ in.	8 40	10 52
1 in.	12 41	15 56
1¼ in.	16 79	21 05
1½ in.	20 08	25 16
2 in.	27 01	33 86
2½ in.	43 29	54 11
3 in.	56 61	70 76
3½ in.	71 76	88 78
4 in.	85 02	105 19

Standard Lapweld

2 in.	31 82	38 30
2½ in.	47 97	58 21
3 in.	52 73	76 12
3½ in.	78 20	96 14
4 in.	92 65	114 00
4½ in.	1 12	1 37
5 in.	1 30	1 59
6 in.	1 69	2 06
7 in.	2 19	2 68
8L in.	2 30	2 81
8 in.	2 65	3 24
9 in.	3 17	3 88
10L in.	2 94	3 60
10 in.	3 79	4 64

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

	Montreal	Toronto
Copper, light	$15 00	$20 00
Copper, crucible	18 50	24 50
Copper, heavy	18 50	24 50
Copper, wire	18 50	24 00
No. 1 machine composition	19 00	22 00
New brass cuttings	10 00	15 50
Red brass turnings	13 00	18 00
Yellow brass turnings	9 00	13 00
Light brass	7 00	9 50
Medium brass	9 00	12 00
Heavy melting steel	20 00	22 00
Shell turnings	9 00	12 00
Boiler plate	21 00	20 00
Axles, wrought iron	30 00	24 00
Rails	26 00	23 00
No. 1 machine cast iron	30 00	33 00
Malleable scrap	25 00	20 00
Pipe wrought	18 00	17 00
Car wheels	38 00	30 00
Steel axles	34 00	35 00
Mach. shop turnings	9 00	8 50
Stove plate	22 00	19 00
Cast boring	11 00	12 00
Scrap zinc	6 50	6 50
Heavy lead	6 00	8 00
Tea lead	5 50	5 75
Aluminum	16 00	20 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

	Per gross ton
Bessemer billets	$47 50
Open-hearth billets	47 50
O.H. sheet bars	51 00
Forging billets	60 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails	60%	
Spikes, ⅜ in. and larger	$7 50	
Spikes, ¼ and 5-16 in.	8 00	

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	**18 to 70**
Soldering coppers, lb.	0 58
Lead wool, per lb.	**0 16**
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	**15 50**
Glue, English	**0 35**
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	**0 33**
Benzine, per gal., bulk	**0 32**
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	**0 03½**
Sulphur, rolls	**0 05**
Sulphur, commercial	**0 04½**
Rosin "D," per lb.	0 07
Rosin "G," per lb.	**0 08**
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	**35**
S.S. drills, wire sizes, No. 53 to 80	**40**
Standard drills to 1½ in.	**40**
Standard drills, over 1½ in.	**40**
3-fluted drills, plus	**10**
Jobbers' and letter sizes	**40**
Bit stock	**40**
Ratchet drills	**15**
S.S. drills for wood	**40**
Wood boring brace drills	**25**
Electricians' bits	**30**
Sockets	**40**
Sleeves	**40**
Taper pin reamers	**net**
Drills and countersinks	**list plus 40**
Bridge reamers	**50**
Centre reamers	**10**
Chucking reamers	**net**
Hand reamers	**10**
High speed drills, list plus	**75**
High speed cutters, list plus	**40**

COLD ROLLED SHAFTING

At mill ..... list plus 40%
At warehouse ..... list plus 60%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 50
Sheets, black, No. 10	10 00	8 50
Canada plates, dull, 52 sheets	9 00	9 15
Can. plates, all bright	9 50	10 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	10 70
Premier, 10¾ oz.	.....	11 00
Zinc sheets	**20 00**	**20 00**

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$36 00	$.....
1¼ in.	40 00	.....
1½ in.	43 00	36 00
1¾ in.	43 00	36 00
2 in.	50 00	36 00
2¼ in.	53 00	38 00
2½ in.	55 00	42 00
3 in.	64 00	50 00
3¼ in.	.....	58 00
3½ in.	77 00	60 00
4 in.	90 00	75 00

Prices per 100 ft., Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	**26½**
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	**0 38**
Brass sheets, 24 gauge and heavier, base	**0 43**
Brass tubing, seamless	**0 46**
Copper tubing, seamless	**0 48**

WASTE.

White.	Cts. per lb.		
XXX Extra	20	Atlas	18½
Peerless	**21**	**X Empire**	**17¼**
Grand	**19¾**	**Ideal**	**17¼**
Superior	**19¾**	**X press**	**16**
X L C R	**18½**		

Colored.			
Lion	15	Popular	12
Standard	**13½**	**Keen**	**10½**
No. 1	**13½**		

Wool Packing.			
Arrow	**25**	**Anvil**	**15**
Axle	**20**	**Anchor**	**17**

Washed Wipers.			
Select White	**11**	**Dark colored**	**09**
Mixed colored	**10**		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	**42 50**	**43 00**
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	**46 00**	**44 00**
Copper sheet, tinned, 14x60, 14 oz.	**48 00**	**48 00**
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	**45 00**	**44 00**

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

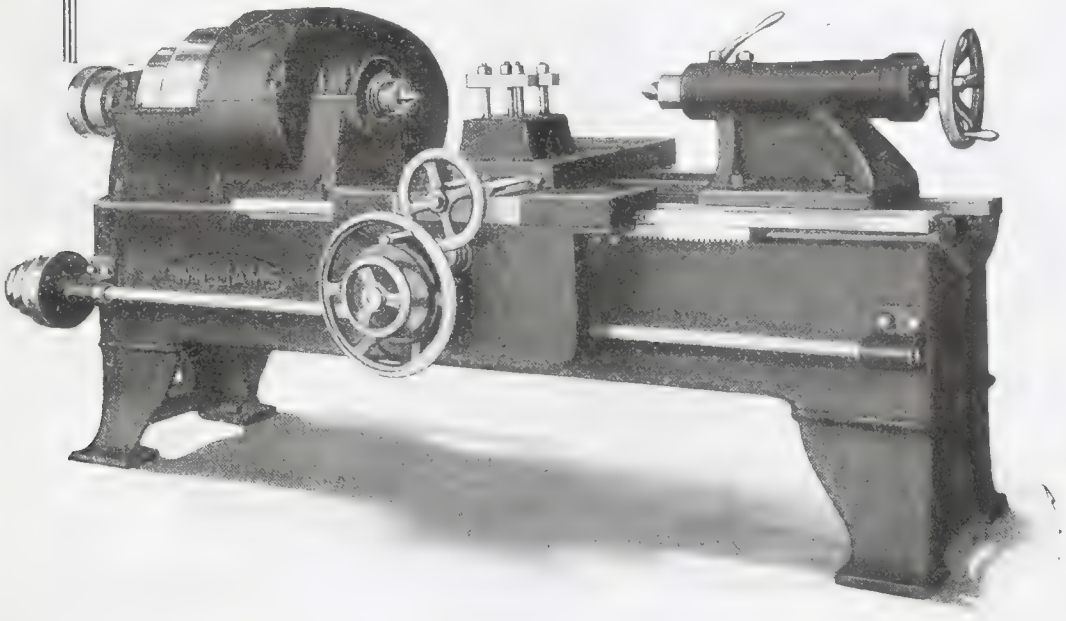
Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

The "WILLIAMS" 24" Heavy-Duty Lathe

will give you a substantial increase in production on Second Rough Turning and Finish Turning operations.

Its Rugged proportions, Ease of handling, Steel gears running in oil and Unbreakable Apron are features into which you should look.



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The A. R. WILLIAMS Machinery Company, Limited

TORONTO

Steel Castings

Quick Deliveries

We Specialize in

High-Grade Electric Furnace Steel Castings

Let us quote for your requirements

The Thos. Davidson Mfg. Co.
Limited

Steel Foundry Division:
Lachine Canal, Que.

Head Office:
187 Delisle St., Montreal

For Hoisting Heavy Materials or Hauling Loaded Cars

Made in 7 Sizes

10 H.P.
15 "
20 "
25 "
32 "
40 "
50 "

Made with two drums also if desired.

We can also supply this Hoist geared for direct connection with an Electric Motor. Let us send you photograph or catalogue.

May we submit a tender on your Castings and Steel Plate Work?

Marsh Engineering Works, Limited
Established 1846
Belleville, Ontario

Sales Agents: Mussens Limited, Montreal Winnipeg and Vancouver

If any advertisement interests you, tear it out now and place with letters to be answered.

RUSSELL MOTOR CAR CO. HONOR WOMEN FOR FAITHFUL SERVICE

FOR continuous and faithful services, covering a period of over two years in the manufacture of munitions at the plant of Russell Motor Car Co., Toronto, 180 women received solid gold badges at a meeting held in the plant on Sunday afternoon, December 29. That portion of the former shell shop, fronting on King street, had been cleared out and decorated for the occasion. A platform was erected on one side of the room, on which were seated Hon. Dr. Cody, the guest of the afternoon; T. A. Russell, vice-president and general manager of the company; J. F. MacKay, treasurer; Mrs. Russell and her daughters, Col. Alby and Lieut. Tenny, who are connected with the U.S. Ordnance Department in this country. Selections by an orchestra, and songs by Frank Oldfield completed a splendid programme.

The presentation to the women was made by Mr. Adams, factory manager of the Toronto works. The badge is of solid gold. It is made to represent a wreath of maple leaves surrounding a 9.2-inch shell, upon which is embossed a replica of the factory building. Upon the reverse side is the inscription: "Presented to ———— by the Russell Motor Car Co., Ltd., for two years of faithful service making munitions."

T. A. Russell, in a short address, paid tribute to the manner in which the women had played their part in the manufacture of munitions. "Three years ago on New Year's Day, Mr. Harris, Mr. Burt and myself decided to go into the manufacture of munitions, and in the month of April following the first shipment was made from here." Canada had provided 55 per cent. of all the shrapnel used by the British army. In the manufacture of fuses there had been an enviable record, as from this country had been sent 12 per cent. of all the time fuses used for British high explosives and shrapnel. In the turning out of six and nine-inch shells on British order the same held true, and from this country had gone half of the nine-inch shells used on the British front in France. The Russell Co. had been the pioneers in the employment of women in the making of munitions, the start being made in January of 1916, and some of these women had remained with the company until the last day on which munitions were turned out on the premises. "In the last few years employers have had a chance," stated Mr. Russell, "to see the advantage of good working conditions and good wages. It does not pay to hold back your best efforts in anything you may undertake. It does not pay to hold back production. The more that is produced the more there is to divide. We hope to turn to something in the peace lines in the near future that will enable us to provide employment again for those who have been associated with us during the past two or three years. I have just learned that one girl, one of the first to be employed here, has made provision for the future in a splendid way. She has got married, and I consider this a most far-sighted method of providing for the period of reconstruction," concluded the vice-president amid laughter.

"This gathering is unique," remarked Hon. Dr. Cody, "in that it sets forth the relations that should exist between employers and employees. There can be no satisfactory development except by co-operation, and the spirit that has prevailed here is the spirit that should prevail in the future." Dr. Cody expressed the opinion that the peace of the world depended now on the league of English-speaking nations. "This has been," he continued,"a war of elaborate machinery. At the start the Old Contemptibles had to fight with bare arms against German preparation of years. By and by, in May of 1915, we found out that we needed high explosive shells, and then it was that Lloyd George organized the Munitions Board. It is almost impossible to realize the change that has taken place since then. At the start there were only three state arsenals in England. To-day there are 180. The whole system was transformed to make munitions, and it is due to two things that it was possible. The first of these was the British genius for organization. There was a time when the Germans used to tell us that they were the only people who had a genius for organization, and for a long time we made the mistake of believing that this was the case. The second factor was British womanhood. In 1914 there were 18,000,000 manual workers in Britain. Six and a quarter million from the ranks of British labor joined the army, and in view of that record let no one ever state that labor in Britain was not loyal in the war. Four million went to the munitions shops and allied industries, leaving seven and a half million to carry on trade and commerce, and yet it was done. But how? By the help of the womanhood of Britain, who turned in and did 1,701 different kinds of work that had been done by men before the war. One million women went to the munition plants, half a million to the chemical and explosives plants, and 300,000 went as farm laborers, all that liberty and decency might live. To-day we are here to thank God for the victory, for no other power could have won it. We are here to pledge ourselves afresh to our country and our God."

Speaking, in conclusion on the lessons of the war, Dr. Cody claimed that we should have learned the value of thrift. Our habits of waste had been the product of our land of plenty. There is also need of more intelligence on the part of the great masses of the people, as there is nothing that would assist so much in the future. Factories had learned the value of unlimited production and high wages, his contention being that there could be nothing more shortsighted than a policy that limited production and kept down wages. "Canada was worth the lives of our soldiers, it was worth fighting for, it was worth working for, and let us never forget that it is worth living for."

The addresses of the afternoon were followed with very close attention, and the entire afternoon was one that will long be remembered.

FOX CHAIN CO. TO LOCATE IN HAMILTON

Expect to Be in Shape to Commence Operations Inside of the Next Few Months

Hamilton.—The Fox Chain Company of Canada, an industry capitalized at $200,000, has been secured for Hamilton by C. W. Kirkpatrick, Commissioner of Industry, and has already commenced to install a plant, which will be in operation by the first of the new year.

F. A. Fox came to Hamilton about three years ago and started in business in a small way, locating himself in a small factory on Yorke Street. Handicapped by lack of financial backing he was compelled to close the place down, selling out his interests, but retaining his patent rights. He returned to New York City and interested financiers there, and has secured capital enough to carry on a business.

After leaving Hamilton three years ago, Mr. Fox engaged considerable time on inventing a new appliance for tire chains, and has found a new snap that will prove a feature in the new Fox chains. A few days ago negotiations were completed for the new concern to take over the plant of the Ford-Smith Machine Company on Princess Street. This does not mean that the Ford-Smith people are decreasing their plant, but that they are erecting a new building which will house their entire business instead of having several small plants scattered through the city.

The new local concern will employ 40 to 50 men to commence with, and by spring will have about 100 on the pay roll. Frank A. Fox is president; Wilfred North, New York City, vice-president; Frank G. Cornish, New York City, secretary-treasurer, and T. C. Binkley of Hamilton, director.

Both Welland and Toronto made efforts to secure the industry for their city, however. Mr. Fox announced that Hamilton was the choice of his company and had already located himself here.

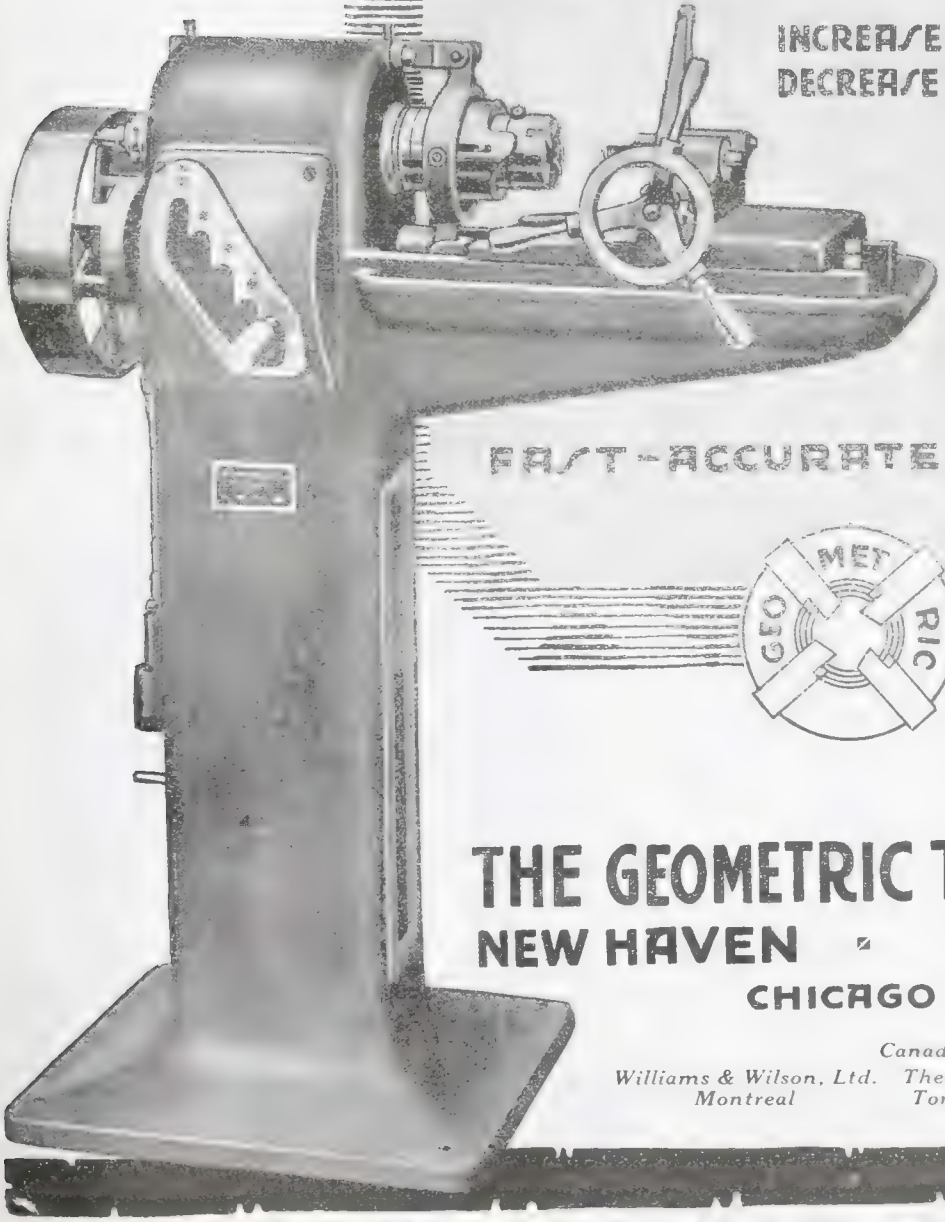
Trouble With Gas

Hamilton.—Due to a recent order of the Commissioner of Gas instructing the United Gas and Fuel Company to cease supplying manufacturers without permits with gas, this order has affected about thirty local firms, and in some cases it is a hardship. It has been the custom to issue monthly permits for the use of natural gas, and the commissioner cut off thirty firms between November and December of this year. P. V. Brynes, president of the gas company, has taken the matter up with the Commissioner in the hope that the affair will be remedied.

GEOMETRIC

THREADING MACHINES

INCREASE THE OUTPUT
DECREASE THE EXPENSE



FAST-ACCURATE-SIMPLE

GEO MET RIC

THE GEOMETRIC TOOL COMPANY

NEW HAVEN ▪ ▪ ▪ CONN.

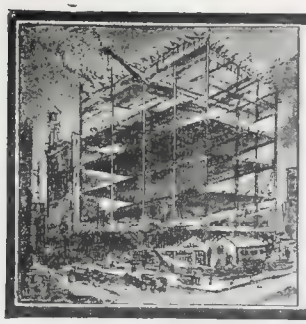
CHICAGO STORE

Canadian Agents:

Williams & Wilson, Ltd. Montreal

The A. R. Williams Machinery Co., Ltd. Toronto, Winnipeg and St. John, N.B.

If interested tear out this page and place with letters to be answered.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS
PERSONAL AND TRADE NOTES

TRADE GOSSIP

New Pulp Mill for Chicoutimi—The Price Bros. Ltd. are about to construct a large pulp mill at Chicoutimi, on the Saguenay River, a few miles west of the village. Power for the new mill will be obtained from the Shipsaw River.

Vancouver.—The sixth vessel to be launched from the Coughlan yards was launched on the Wednesday preceding Christmas. The vessel was named the "War Convoy" and makes a total of 52,800 tons that Manager John Lockhart has seen completed and placed into the water under his direction.

Complete Section of Canal—Work will be continued on an early date on the third section of the Welland Canal, the contract having been let to Doheny, Quinlan and Robinson. This is one of the most expensive sections of the work, the cost being estimated at approximately $9,000,000.

McPherson Manufacturing Co., Ltd., with a capital stock of $50,000 divided into 500 shares of one hundred dollars each, has been formed at Hamilton. The new company will operate the business now carried on by J. A. McPherson, as general iron and steel manufacturer, enameller, galvanizer, etc. The head office will be at Hamilton.

Start Work Again—The Motor Truck Works in Brantford, which was the last plant in Canada engaged in Munition work for the U.S. Government, suspended work a few days ago. Orders have been received from the U.S. to go ahead again on the work which was suspended, and it is believed that the contract will be completed here. The contract is for 9.5 shells.

Cleaning Up.—The Imperial Munitions Board have quite a number of details to clear up before finally disbanding. Many of the plants carrying on work for the Board have written off the cost of their original buildings and machinery, but some have made large expenditures recently, in expectation of the continuance of hostilities. The claims arising out of these cases have got to be adjusted, and these adjustments are being carried on under the direction of Mr. F. N. Southam, Director of Steel Production.

To Wait Three Months.—The question of freight and express charges and credit arrangements was fully discussed at a meeting composed of representatives of the manufacturers, the secretary of the Railway Board, and officers of the accounting departments. It was agreed that the regulations should not be put in effect till March 1st next. In the meantime the Manufacturers' Association will appoint a special committee to study the question and make a counter proposal to be presented to the Board before March 1st.

Jas. Arnold, well known in Imperial Munitions Board circles, and more recently with the Turnbull Elev. Mfg. Co., Toronto, has been appointed works manager of the Canada Foundries & Forgings, Ltd., plant (Jas. Smart Mfg. Co.) at Brockville, Ont.

CANADIAN SHELL SHOPS PROVED EYE-OPENER TO ENGLISH ENGINEER

"To me, as an engineering man of some 30 years' experience, the Canadian shell shop was a revelation. Canada could not learn anything from the world in the production of shells. I have been in practically every shell shop of any importance in the Allied countries, and from that point am able to appreciate the work that has been going on in this country."

Such was the statement of the representative of one of the greatest British industrial concerns, at present in Canada on a special mission, when speaking to MACHINERY this week. We are not, for the present, permitted to state the name of the firm he represents, nor the nature of his business, which has kept him in United States and Canada for the last four months. It is sufficient to state, however, that there will be an announcement of considerable importance from his firm before many weeks, which will mean much to the industrial life of this country. It will also serve to bring this country and the Old Land closer together in many ways.

The After-War Problems

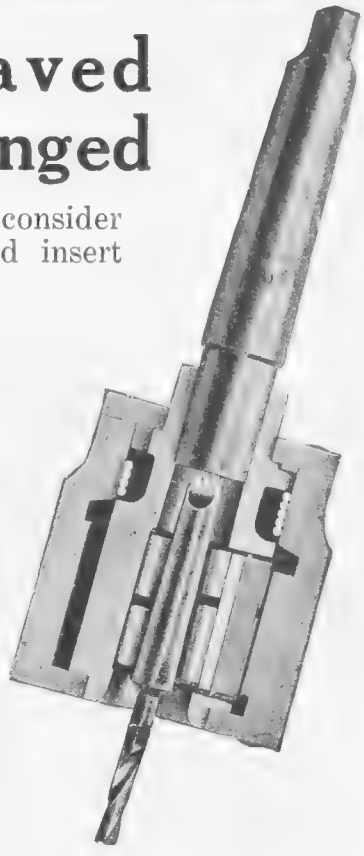
"Britain is in good shape for the after-war business," remarked the "Londoner." "The manner in which some of the first large orders for steel have gone to the mills of England has shown this very plainly. It is as long as a year and a half ago that work was started on the lines of reconstruction, and it has been going on ever since in a very direct manner. Questionnaires were sent out all over the country, and an enormous amount of information was secured. For instance the number of steel angles, beams, etc., that would be required in every centre was very carefully estimated for the first three months following war, for the next three months, etc. The same plan was followed in every commodity, and in this way it was possible to get a pretty fair idea of the men whom it would be necessary to release from active service first on the cessation of fighting. Lines that were found not to be in demand would indicate that those skilled in this direction would be retained longest in the service. The plan has worked well, and although some of the critics seem to consider it rather unwieldy, it is serving the purpose and securing results.

Condition of the People

"One notices a great change in the people of Britain," continued our informant. "When I discuss this matter I want you to understand that I speak as a Conservative. There has been an understanding of each other's problems brought about by the war that could not possibly have come in any other way. The aristocratic employer of labor, the master of the old school, has come down from his unreasonable position. The radical, unreasonable labor man has come down from his impossible stand, and these forces have met as they never have met before. Even after the removal of the necessity of the winning of the war, this feeling is still very marked, and it is the greatest thing that ever happened in our country. In our own concern, I have seen shop deputations sitting in the office of Sir ——, the head of the business, reasoning with him, and he with them, over their problems and difficulties. Such a thing a few years ago was absolutely unknown. When the call came for more food every man went to work. Within a few miles of London I grew one thousand bushels of potatoes. Several artisans had plots along by mine. We became well acquainted. I learned their point of view, and they learned mine. That condition was repeated thousands of times all over the country, and it is going to have its effect. Moreover the industrial managers of the old land have found out that the way to get real results from the men in the shops is to pay them enough wages to make them happy and satisfied. There is a good future ahead of industrial Britain."

Consider the Minutes Saved Every Time a Tool is Changed

To understand the worth of this Automatic Chuck to you, consider that it will enable your operator to remove one drill and insert another **in two seconds without stopping spindle.**



Aikenhead's Wahlstrom Chuck

automatically centers the tool, and the entire shank grip of the jaws makes slippage absolutely impossible.

This Aikenhead Wahlstrom Chuck increases output by saving 50% on time and labor.

Write for Booklet.

Aikenhead Hardware Limited
17 Temperance St. **TORONTO**

Aikenhead's Van Dorn ELECTRIC TOOLS

Portable Electric Drills

are as proof against fool usage as an electrical device can be built, and they are so constructed that they work in the open, summer and winter, in rain and snow storms, without developing the slightest trouble.

Van Dorn Electric Drills cut neat, clean and fast through every material from wood to steel. They are guaranteed to drill 50% more holes, at one-third the cost for power, than the best pneumatic drill of similar rated capacity.

Capacity in Solid Steel

DAOOO	3-16 in.
DAOO	¼ in.
DAOOX	5-16 in.
DAO	⅜ in.
DA1	½ in.
DA1X	⅝ in.
DA2	⅞ in.
DA2X	1 in.

Write For Catalogue

Aikenhead Hardware Limited
17 Temperance St. **TORONTO**

New Telephone Plant.—The Bell Telephone Co.'s new building at Collingwood being nearly completed, the company are now receiving the plant necessary for changing over from the present equipment to the more modern system. Installation will be commenced at the first of the year, and the office will be transferred to the new quarters at the beginning of March.

London Saves Money—The general manager of the Hydro-Electric Power Department of London in his report shows that London saved about $15,000 by the enforcement of the power conservation regulations during the past year. The normal peak load of 10,000 horsepower was cut to 8,000 horse-power, but since the signing of the armistice the 10,000 is again being used.

Rumor of Bonus—There is a considerable amount of talk in railroad circles as to the probability of the Canadian Locomotive Company declaring a bonus or an extra dividend. This was not discussed at the meeting, the regular dividend being declared, it being thought it was just as well to defer any action of that kind until something definite in the way of contracts from the Canadian Government were received.

Elevator Burned Down—The elevator of Woodward & Co. at Portage la Prairie was destroyed by fire last week with a loss estimated at $150 000, fully covered by insurance. The capacity of the elevator was 165 000 bushels, and it was nearly filled with grain at the time of the fire, but it is thought that a large portion of this may be salved. Nine loaded cars and seven empty cars were destroyed at the same time.

Government Hospital Addition. — A permit has been secured from the Toronto City Architect's Department for a $50,000 extension to the Military Orthopedic Hospital, Christie stret. The new wing will be for kitchen purposes. The land has been secured, and construction will be rushed. Since last summer the Department of Public Works has added one large wing and several storeys to the existing building.

Superintendent Gives a Banquet—The employees of the St. Thomas Construction Co. were tendered a banquet by George C. Kaiting, superintendent of the shell department. About 15 guests were present, and were entertained most royally by the. genial superintendent Following the meal, some short addresses were given, after which a varied and pleasing musical program was given. The affair was to mark the closing of the shell-making operations of the company.

Resume Private Trade—The War Trade Board of the United States has announced through Chairman McCormick, that special consideration will be given to trade with Alsace-Lorraine, and a rapidly broadening program of trade with many nations will be developed. The general resumption of trade now in prospect embraces countries from the Arctic Ocean to the Tropics, and resumption of trade with Finland under adequate control is receiving strong consideration.

Government Announcement. — Additions to federal buildings throughout the country, which had been planned before the war, will soon be started, according to an announcement from Ottawa. The Government bought, just before the war, property on the northwest corner of John and Main street in Hamilton, for an addition to the Custom House, and it is surmised this work will be included in the work mentioned in the announcement.

Lyons Fair Interests.—The big international fair, to be held at Lyons in March, will have a big representation of Canadian manufacturers exhibiting their products. The Canadian Manufacturers' Association announce a list of fifty-one firms, nine of whom are Montrealers, who have decided to have an exhibit at the fair. This fair has taken the place of the historic fair which used to be held at Leipsic before the German people went mad.

New Marine Equipment Shop.—Wm. Kennedy and Sons, Ltd., of Owen Sound, have nearly completed a large addition to their factory. The new building is 50 feet by 100 feet in the ground area, and about 33 feet high. It is well built, steel and concrete construction being employed, and will be equipped with an electric travelling crane of 20 tons capacity. The shop will be used as an erecting shop for marine machinery, which the company are manufacturing.

Open New Office.—On January 1st, 1919, Canadian SKF Co. of Toronto will open a sales office at 412 St. James St. W., Montreal, Que., under the direction of Mr. Geo. F. Shepard. The growth of the S K F Companies has been remarkable. Commencing in 1907 in Sweden with an initial staff of twenty people, it now comprises a plant employing 15,000 persons, controlling three mines where the special grade of ore for this product is mined. Plants are also established in France; Luton, England; Hartford, Conn.; Philadelphia, etc."

Chemical Director Talks—The director of the Chemical Division of the War Industries Board of the United States, Mr. C. H. McDowell, has recently revealed the reason why American farmers received only 66,778 tons of nitrates instead of 100,000 tons through the $10,000,000 appropriation made by Congress. The remaining 42,000 tons were commandeered by the War Department when the German drive became a menace last spring. Military necessity has kept the details a secret hitherto, but it can be told now that the sacrifice of the fertilizer made possible a much greater supply of explosives.

Not Satisfied With Bonus.—The decision of the Imperial Munitions Board to grant bonuses to those who were in their employ on November 11 only, was taken strong exception to at a meeting called by an examiner and two inspectors of the Munitions Board for the purpose of discussing the matter. A committee of eight men was appointed with Inspector Watson as chairman to interview the Provincial representatives at Ottawa, and other men of influence, with a view to sending a deputation to Ottawa to interview the Imperial Munitions Board on the matter.

Too Much Lead—There is a surplus of lead in Canada without the support of a large demand for munition purposes, and the price has dropped materially in consequence. Mr. J. J. Warren, of the Consolidated Mining and Smelting Co., which operates largely in British Columbia, says the condition is serious. In addition to approximately 8,000 tons of pooled lead unsold, there is a large quantity remaining in the hands of the Imperial Munitions Board.

Toronto v. Express Companies—When the representatives of the city of Toronto and those of the express companies appear before the Dominion Railway Board next month, one of the biggest fights of recent years will be on. Elaborate preparations are being made on both sides. The express companies are appealing against the recent order extending the area of free delivery to St. Clair and Danforth avenues, but the city is asking that the zone of free delivery shall include every district within the city border. The companies will endeavor to show the unprofitablenss of the present system, and that deliveries thought the sparsely populated districts means a distinct and heavy loss.

Ferry Service.—The train ferry service between England and France has been one of the interesting developments of the war. The scheme was approved by the British Cabinet in January last and has been in operation only eight months, but during that time it has carried across the Channel 17,686 ten-ton railway waggons, or their equivalent in linear measurements, and 237,733 tons of gross dead weight. The train ferry is in great demand since the signing of the armistice to bring back stores and troops from France. This form of ferry, though familiar enough on this side of the Atlantic, is a development quite new to the British Islands, and its successful operation over so bad a strip of water as that between Dover and Calais is something of an achievement.

Sault Ste. Marie.—The report of the United States engineers shows a marked decrease in the amount of traffic passing through the canals here during 1918. The total movement of freight of all kinds amounted to 85,680,327 short tons, the lightest movement since 1914. Wheat shipments totalled 122,718,146 bushels, and grain other than wheat 30,000,621 bushels. The volume of flour handled was 8,228,844 barrels. Coal shipments came to 17,981,510 tons, of which 15,770,560 was bituminous. Iron ore shipments totalled 60,551,296 tons, and copper ore 86,078 tons. The amount of copper shiped was the lightest since 1913.

Shell Plant Closes. — The Lougheed Shell Co., Sarnia, closed down two weeks ago. This company has been engaged manufacturing the 18-lb. shrapnel shell, and for two years and a half 50 men have been working day and night, and about 400,000 shells have been made.

Ottawa.—Referring to the statements made in connection with the loss of the "Princess Sophia" in Alaskan waters, that the salvage laws prohibited Canadian vessels performing salvage in American waters, and vice verse, Mr. A. Johnston, Deputy Minister of Marine, said this did not apply to saving human life. The laws applied only to the salving of wrecks, and not to rescue work from ships in distress.

Oil in Alberta.—The Shell Transport and Trading Co. has an application under consideration by the Federal Government for a concession to develop the whole of the oil-bearing lands in Alberta north of the Athabasca River. This concession is to be in the form of a monopoly for five years, respecting, of course, the rights of the leaseholders and prospectors already in the fields. In return for the concession the company will pipe the oil to Vancouver or the head of the lakes, and after receiving six per cent. on its investment, divide the remaining profits with the Government.

Toronto—Attention is being given in many quarters to the difference in cost of building ships on this continent and those built in Great Britain and Europe. This is not a new condition, but one which has prevailed for many years, and is the principal reason why the United States and Canada have in the past had practically no mercantile marine. Another feature is the higher cost of operating ships which are registered in Canada or the United States, particularly the States, and thirdly the enormously inflated cost of overhauling and repairs on this side over those prevailing in Europe.

Detroit.—The project of making a deep waterway from the Great Lakes to the St. Lawrence and Atlantic Ocean has been brought again. A resolution was introduced into Congress by Senator Townsend of Michigan recently, for an investigation of a deep water project which would allow ships of deep draught to enter the harbors of Duluth, Chicago, Milwaukee and other Great Lake ports, after direct passage from Atlantic ports of this and other countries. Several American and Canadian Great Lake ports are taking up the idea with eagerness, and many engineers think the scheme quite feasible. This would give the shortest route to Europe and eliminate the rail haul so much in use now, with its attendant troubles of transhipment.

Ottawa.—The Marine Department has closed further contracts for six steel vessels. Two vessels of 8,100 tons each will be built by John L. Mullen Construction Co. of Prince Rupert, B.C., a Pittsburgh concern, which has leased its drydock and shipbuilding facilities from the Grand Trunk Pacific, and contemplates carrying on extensive work at that port.

Vancouver, B.C.—The alleged refusal of the Coughlan Shipyards to reinstate a returned soldier caused 2,000 men to quit work.

The Port Arthur Shipbuilding Co. will build two more vessels of 4,250 tons each, which will have to come through the canals in two sections and be joined together at Montreal or Quebec. New Glasgow gets two ships of 2,800 tons each, which will be built by the Nova Scotia Steel Co., specially designed for the West Indian trade.

Quebec.—The American Shipping Board officials, who have been in Quebec all summer looking after the rejoining of ships for the United States Shipping Board, which had been cut in two for coming down from the lakes, are expecting to remain in Quebec for the winter. They were expecting five ships down from Montreal this week, which would be placed in the dry dock at Lauzon There were three vessels in the Levis dock being put together, each of 4,800 tons, two of which are expected to come out soon and proceed to Sydney, B.C., for cargoes of coal.

Ottawa.—A deputation representing the Toronto Harbor Commissioners, received assurance from the Minister of Public Works that work on the Toronto harbor would be carried on in 1919. It is estimated that the work to be proceeded with would give employment to more than 800 men during the season of 1919.

Ottawa.—The number of ships built in Canada during the war, up to the end of November last, was 381. These were divided between sail and steam, the sailing vessels aggregating 199 with a gross tonnage of 44,135, and 182 steamers. 160 of these steamers were for Canadian registry, and their gross tonnage was 69,612, while the remainder were built for the Imperial Munitions Board.

Air Service for P.E.I.—A company is planned, to be known as the Prince Edward Island Aerial Transportation Co., capitalized at $25.000. The initial route planned was Moncton, Summerside, Charlottetown, Pictou, New Glasgow and Halifax, with a double daily service summer and winter. Mail and express to be handled first, and later passengers. Major Kennedy, R.A.S., expert of the Aircraft Company, London, submitted the proposal to the meeting.

Last Contract Closed.—Motor Trucks, Ltd., of Brantford, received word last week that work on the 9.5 shells for the U. S. Government was to be suspended. This was the last U. S. contract in Canada. About 500 men were laid off as a result of the cancellation, but it is thought they will be absorbed by other local factories.

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Co-operation in Research—The Advisory Board of the Council for Scientific and Industrial research is co-operating with the newly formed Guild for Research formed by the Maritime Provinces' Fish Canning Association. The Guild has arranged an appropriation of $5,000 for investigating the fish preserving problem, and the Advisory Council has given a grant of $2,000 to this work. The Advisory Council is also arranging to publish a reference bulletin on Canadian building stones, giving very full data on their properties, and is also studying through a special committee ways and means of aiding scientific publications in Canada.

Unemployment Figures—A statement from Mr. John Young, of the International Association of Machinists, on behalf of the union in Toronto districts, is to the effect that there are 35,000 unemployed workers in Toronto and vicinity. He contends that the speech of Hon. A. K. MacLean, made in the Chateau Laurier, Ottawa, recently, is far from correct, and that there are more men unemployed in Toronto district than the Hon. A. K. MacLean credited to the whole of Canada. Mr. Young states that the exact number of unemployed is being compiled by his organization, and will be furnished to the Labor Department at an early date.

Returns Bonus—When the British Chemical Co., one of the plants of the Imperial Munitions Board, located at Trenton, the town gave a bonus of $10,000. The shutting down of the plant, due to the armistice made it impossible for the plant to carry out their part of the agreement with the town, so the company have handed back without question the $10,000 they had received. The outlook for a resumption of operations is very favorable, several experts of the British Chemical Co., having been engaged by a large syndicate to make investigations into the possibilities of using the plant to manufacture fertilizers and commercial acids.

New Patents.—The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, 59 Yonge Street, Toronto, from whom further particulars may be obtained: Hugo Gronroos, molds for casting building blocks; James W. Moffat, processes of treating metallic oxides; Bernhart Zwillinger, apparatus for converting beehive ovens into by-product coke ovens; Wm. R. Holliday, steam turbines; Bennet Emerson and Henry C. Morris, gas meter valve protector; John G. A. Kitchen, means for reversing screw-propelled boats; Minerals Separation North American Corporation, ore concentration; Alfred Darker, brush and terminal contact mechanism of dynamo electric machines; Henry W. White, apparatus for dispensing liquids; Charles Gilliett, fuse controls for multiphase circuits: Robert S. Stratton, anti-skid tire treads; Bartholomew Bowler, artificial hands; Gutta Percha and Rubber, Ltd., half soles for boots and shoes.

PERSONAL

The death of Edward V. McConville, secretary and sales manager of the Modern Tool Co., occurred on Tuesday, November 26.

George Gray, assistant general manager of the Acadia Coal Company, Halifax, was presented by the company and staff with a chest of silver and an address signed by the executive management and his fellow officials. The occasion was the thirty-fifth anniversary of Mr. Gray's connection with the coal mining industry in Nova Scotia, and particularly with the Acadia Coal Company.

Joseph Bourque, a well-known contractor of Hull, Quebec, died at his residence in that city last week after a brief illness. Mr. Bourque had lived in Hull for the past thirty years and had carried out some notable works, among them being the Church of the Sacred Heart, Ottawa; Notre Dame de Grace, Hull; Court House, Hull; Montreal Central Post Office, and the new High School, Montreal. Mr. Bourque was a native of L'Assomption, Que.

J. J. Coughlan, the well-known Vancouver shipbuilder, in speaking of the prospects of shipbuilding in Canada, gave it as his opinion that about three years would be the extent of the present boom in shipbuilding. When the more pressing requirements of the world are met and shipping is normal, the only opening for business here would be for rush orders, and he did not anticipate many of these. Mr. Coughlan's opinion is based on the relative cost of construction here and abroad.

Victor VanderLinde and Samuel Adinoff were the speakers at the Enginers' Club of Toronto monthly dinner at the club quarters on King Street. Mr. Adinoff, who for some time was with the National Synthetic Chemical Company of New Jersey, spoke on the manufacture of picric acid, which, he declared, now that the war was over, to be a dead industry. Mr. VanderLinde spoke on the development of lighter-than-air craft in this war, and their possibilities for the future. He said that dirigibles, and kite balloons had been particularly valuable in naval operations.

William J. Galbraith, a well known Montreal civil engineer, died at his residence, 4145 Dorchester street, Westmount, on Dec. 21st from pneumonia. The deceased gentleman, who was only 32 years of age, had enjoyed a very successful engineering career. He graduated from McGill in 1909, and at the beginning of 1910, was engaged in the Rocky Mountains with the Geological Survey, and in the fall of the same year, he entered the firm of M. P. & J. T. Davis, as assistant engineer on caisson work for the Quebec bridge, remaining there till the spring of 1912. He then started in construction work for himself, and carried out many important works for the Dominion Government. At the outbreak of war he entered the Foundation Company of New York as superintendent of construction, in which position he remained until his death. He was a member of the British Institute of Civil Engineers, and leaves a widow and one daughter.

H. E. Rice has issued a formal announcement of the appointment of W. H. Graham to the position of superintendent of construction at the Dominion Steel Corporation at Sydney, N.S. This is a new department which will have the supervision of all the work now in progress in the way of construction of new plant and extensions of the existing plant. This includes the new ship plate mill and a number of other important items and will give Mr. Graham ample opportunity for the exercise of his powers of organization. The appointment of Mr. J. H. Fraser to be assistant superintendent of the new department is also announced.

TENDERS

St. Anne de Bellevue, Que.—Separate tenders, addressed to the undersigned, will be received until noon, December 24th, for the construction of guard house, recreation buildings physiotherapy building and special service building, military hospitals Ste. Anne de Bellevue, P.Q. Plans and specification can be seen and forms of tender obtained at the office of the Chief Architect, Department of Public Works, Ottawa; the Superintendent of Military Hospitals, Ste. Anne de Bellevue, P.Q., and of the Overseer of Dominion Buildings, Central Post-Office, Montreal, P.Q. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

Toronto.—Tenders will be received until noon, December 24th, for the construction of boiler-house, power plant, laundry, garage and mortuary, military hospitals, St. Andrews, Toronto, Ont. Plans and specification can be seen and forms of tender obtained at the office of the Chief Architect, Department of Public Works, Ottawa; the Clerk of Works, Postal Station "F," Toronto, Ont., and of the Superintendent of Military Hospitals, Toronto, Ont. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

Ottawa.—Tenders will be received from any Provincial Government, Municipal Council, Harbor Commission, Shipping Company or Railway Company, up until noon of the 27th of December, 1918, for the lease of the Government Wharf at Windsor, Ontario, for a period of three years dating from the first day of April, 1919. Tenderers must quote an annual rental for the property, to be payable in advance each year, it being understood that the public use of the wharf shall not be interfered with and that no wharfage tolls or dues in excess of those established by Government regulations shall be charged. A. JOHNSON, Deputy Minister of Marine, Department of Marine, Ottawa.

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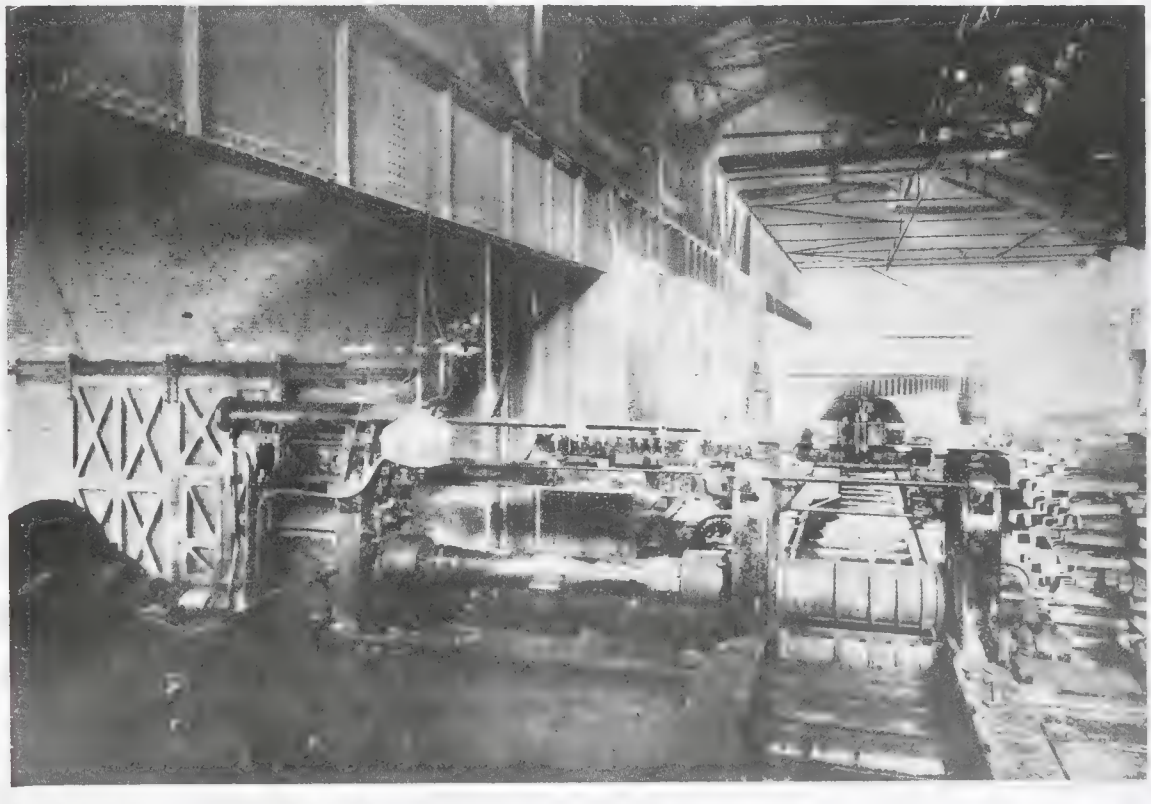

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Ottawa.—The Government will organize a stock company, holding all the stock itself, to operate the new steamers which are being built for Canada. It is planned to put a thoroughly practical shipping man at the head, and leave him free to act. Lines on the Atlantic, Pacific and Caribbean are planned, and also a Great Lakes service. These will all work in conjunction with the Government Railways.

Mr. C. N. Barclay, manager of the British Chemical Co., Trenton, was entertained by about 100 of the business and professional men of the town at the Hotel Gilbert. The plant was built in November, 1916, and manufactured guncotton, smokeless powder, and T.N.T. It belonged to the Imperial Munitions Board.

Extension of Time.—The pig tin committee of the American Iron and Steel Institute, announce extension of the period during which the base prices of pig tin are to be maintained. The prices, which were announced to extend through January, will now be continued beyond that month, until such time as the 10,000 tons allocated by the British authorities for American consumers have been distributed.

Montreal.—The wily Hun is already trying to resume business relations with the people of the British Empire. A circular has been received from a firm of Hamburg shipbrokers, through their branch office at Christiania, Norway, offering their services as shipbrokers to any firm sending their vessels to North Sea or Baltic ports. It will be surprising if relations are resumed so easily as this firm seems to think possible.

Director of Labor.—An official position is created by order-in-council of "Director of Labor, Research and Employment Service." The duties will be to supervise labor clearing houses, to negotiate between Provincial and Federal Governments, and to study and report on ways and means of lessening unemployment, including adjustment of wages, hours, etc.

New Industrial Plan.—At a meeting of the officers and employees of the Imperial Oil Co., Mr. W. J. Hanna, the president, outlined a new relationship to be introduced between the company and its men. Regularly elected representatives of the men will have regular conferences with the executive, at which all questions of wages and working conditions will be settled. An insurance plan, old age pension, and a sick benefit fund are among the changes proposed to be introduced. Mr. Hanna strongly emphasized the fact that there was no intention of philanthropy in these schemes, the idea being purely a business policy to promote continuity of service and eliminate the labor turnover problem.

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MARINE

Colchester.—The last grain boat having passed down, navigation at this end of Lake Erie can be considered closed The lightkeeper and his assistant have come in from the light.

Bordeaux, France. — The American steamer "Lake Bloomington" is stranded at Point de la Coubre, near Bordeaux, and is in danger of breaking up, owing to the heavy seas.

Kingston, Ont.—The Clayton Shipbuilding and Boatbuilding Corporation have launched three harbor tugs for the Canadian Government, and have laid the keels for four Government canal boats.

London, Eng.—Incoming steamers report very heavy weather in the North Atlantic. The British steamers "Linmore" from Portland, Me., and the "Aras" from Philadelphia, both arrived in a damaged condition from the heavy seas.

Halifax, N.S. — The captain of the Canadian steamer "Strathcona," Capt. C. O. Allen, has cabled to his wife from Copenhagen saying he was safe and well. He was taken prisoner in April, 1917, when his ship was sunk by the submarine U-48, and has been in German prison camps till just recently, when he was repatriated.

Vancouver—Still another 8,800 ton vessel was launched from the yards of the Coughlan Shipbuilding Co. last week. This was the "War Convoy" and she was the sixth of the vessels built for the Imperial Munitions Board by this firm. The others were the Alaska, War Camp, War Noble, War Chief and War Charger.

Paris.—An important meeting will be held to determine the shipping needs of the United States and the Allies. It is believed that arrangements will be made by which tonnage will be apportioned as follows: First for European relief; second, return of troops; and third, commercial business.

Washington—The estimated cost of the great shipbuilding plant at Hog Island was estimated recently by Charles Piez, the president of the Emergency Fleet Corporation, to be in the neighborhood of $63,000,000. The yard, he said, has delivered one ship and has laid the keels of fifty more. The approximate cost of the ships being built would be, according to Mr. Piez, in the vicinity of $225 per ton. This is considerably higher than the prices ruling in other countries.

Chicago—The old scheme for converting the Chicago drainage canal into a deep water canal has been revived by the Chicago *Daily News*. Chicago has for a long time been desirous of securing a canal to connect Lake Michigan to the upper waters of the Mississippi, which would give them direct connection by water with the Gulf of Mexico and the Atlantic Ocean. The objection of the Governments, both Canadian and United States, to the scheme, is that it would interfere with navigation on the lower lakes, and affect very adversely the many hydro-electric propositions on the St. Lawrence.

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The Financial Post on Activity in Canadian Industry

"[illegible] Canadian Manufacturers' Association [illegible] activity, to commence with the opening of [illegible] with such problems as standardization of output, export marketing and attendant financing, relations of capital and labor, social welfare in industry, rail and water transportation, inland and overseas, informing of the public, etc. The opportunity [illegible] action along the right lines to put Canadian manufacturing in its rightful place in relation to national prosperity and to strengthen that position by developing export trade which will bring the highest possible return for those natural resources and products which represent our greatest assets."

Besides the important article of which above is the opening paragraph

THE POST

THIS WEEK CONTAINS:

How Marconi Has Weathered War Conditions.
Southern Power Higher Earnings—Wider Field.
Trade Total Less for Current Year
Developments in Railway Affairs of Hamilton Co.
Uniform Laws Would Be Boon to the West.
Big Export Order for Canadian Paper.
Bank of Ottawa Aided the Nation.
Selling Safety Deposit Boxes to Customers
The Skidmore Affair (Editorial).
Need for Tariff Commission (Editorial).
Bond Market Has Christmas Lull This Week.
Will Exchange 850 Bond Lots to Uphold Price.
Thrift Organized in Quebec Province.
Money Bylaws More Numerous This January.
Sir Thomas White's Taxation Offer Criticized.
Various Plans Advocated to Stop Fire Waste.
Insurance Tendencies Discussed by Supt Finlayson.
Important Property Transfers Made in Montreal.
House Shortage Declared to be Only Temporary.
Bank of Commerce Plays Big Part in Foreign Trade.
Bank of Toronto Increased Profit, and Its Service.

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Trenton, Ont.—Local navigators are about to petition the Marine Dept. with a view to getting a wireless station on Duck Island. This is due to the large number of wrecks which have occurred in this vicinity, the steamer Minola being the latest. It is felt that the installation of a wireless plant would afford a means of securing assistance to a vessel in distress.

Paris, France. — Arrangements have been made by which the release of 1,000,000 tons of shipping will be brought about. This tonnage will be taken from the army supply service, and diverted to American export trade, to aid in changing the home industries from a war to a peace basis.

Vancouver, B.C.—The "War Storm," the third of the 4,800 ton steamers being built at the Wallace Shipyards, ran her trial trips last week with very satisfactory results to the owners and builders. The trial gave a maximum speed of 11.92 knots and an average of 11.03 knots. The engines were built in the Wallace Yards. The ship was in charge of Captain W. Ettershank, the veteran pilot.

Collingwood—A launch took place last week at Collingwood, from the yards of the Collingwood Shipbuilding Co., of a 3,500 ton steamer. This was the "Canadian Warrior," the first of the steamers to be built for the Dominion Government on the Great Lakes. The vessel is Canadian-built throughout, the boilers, engines and auxiliary machinery having all been built in this country.

Quebec—The new drydock at Quebec, which is now practically completed, is one of the largest of this type of dock in the world. Its construction has occupied the last four years. Situated on the south bank of the St. Lawrence, it has a length of 1,150 feet and a breadth of 120 feet, and is divided into two compartments, the inner of which is 650 feet long. The interior entrance is closed by a floating caisson, while the outer one has a rolling caisson. It is equipped with pumping machinery capable of emptying it in two and a half hours.

Vancouver, B.C.—The enquiry by a Royal Commission into the differences between the members of the Merchant Service Guild and the shipowners, is now proceeding. The investigation has extended over a considerable length of time, during which a tie-up of the shipping on the coast was caused for a period of 48 hours. The guild consented to lift the tie-up only after being promised a speedy finding by the commission, and an agreement by the legal representative of the companies that they would recognize the finding and abide by it.

London—The Admiralty announces that Admiral J. Jellicoe will shortly visit such of the overseas Dominions as express a wish for his services to organize a scheme of naval defence. The decision of the Dominion Governments to build and maintain navies, which will be trained and organized on the same lines as the Royal Navy, will be a great factor in the maintaining of world peace in the future.

Halifax. — The steamer "Regina," which has just arrived at Halifax with troops is the latest acquisition to the fleet of the White Star Line. She is a vessel of 28,360 tons displacement, and is 600 feet long by 68 feet beam, and an average speed of 15 knots an hour. She is intended to carry only two classes of passengers, cabin and third class, and is the largest steamer of her class trading to Canada.

Montreal.—The "Empress of Russia," and the "Empress of Asia," will soon be returned to their former runs, according to Mr. C. E. Benjamin, passenger traffic manager of the C.P.O.S. These two vessels were taken from the Pacific to the Atlantic for service as troopships, and are now being refitted in England in order to resume their passenger service to the Orient. The "Empress of Russia" will proceed to the East by the Suez Canal, while her sister ship will go to the West Coast via the Panama.

Collingwood, Ont.—The first ship built on the Great Lakes under the Government shipbuilding plan was successfully launched from the yard of the Collingwood Shipbuilding Co. Saturday last . The vessel was named "Canadian Warrior," and is the first of four vessels to be built here for the Department of Marine. The following vessels will be named: "Canadian Recruit," "Canadian Signaler" and Canadian Gunner."

Montreal, Que.—J. W. Norcross, vice-president and chairman of the Canada Steamship Co. reached his office from London on Monday, where he has been in conference with the British Advisory Board regarding the plans of the company during reconstruction. He announced that the Canada Steamship Lines would make arrangements for its own connections on the Atlantic. With regard to the steamers of the line now on the Atlantic, Mr. Norcross said that most of them were under charter till six months after peace was signed, and as there was not much chance of peace being declared till June next, that would mean that the vessels would be under charter till the end of the year, and earning good returns.

Toronto.—The "War Aquila" was launched from the yard of the Polson Iron Works on Sunday last. She was to have taken her initial plunge on Saturday, but owing to the ways sinking into the soft ground, the bow refused to move, and the launch had to be postponed until the ways could be blocked up, the launch taking place the next day. The "War Aquila" is a sister ship to the "War Hydra" and the "War Taurus" and is the fourth freighter to be launched by the Polson Co. for the Imperial Munitions Board. She is 261 feet long, by breadth moulded 43 feet 6 inches, and depth moulded 23 feet. Deadweight capacity is 3,500 tons, and her engines are of the triple expansion reciprocating type. She has two Scotch boilers, 12 feet long and 14 feet diameter, working at 180 pounds per square inch. There are four more steamers under construction at the yard of the Polson Iron Works, all for delivery early in the coming year.

Kingston, Ont. — The whaleback steamer "Atikokan," which came east from Lake Superior, is to be placed in the dry dock of the Collingwood Shipbuilding Co. for structural alterations before being put together. The design not having proved entirely satisfactory some changes are to be made.

Port Huron—The two halves of the "Paipoonge" which were brought here from Collingwood, will be joined together in the Foundation Co.'s dock, and the ship will be lengthened by 50 feet. It was originally intended to take the two sections through the Welland Canal to the coast, but the end of the war changed the plans of the owners.

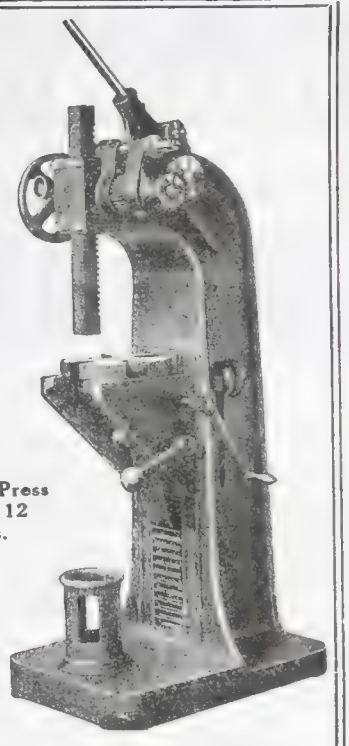
Sarnia—There are quite a number of steamers wintering here, and so far Lake Huron is quite free of ice. Pond nets are still being used in Lake Huron which is very exceptional at this time of the year. The steamers here are Overland, Brainard, Hall, Calvert, Imperial, Manistique, A. Harrison, Smith, Thousand Islander, Huronic, Hamonic, Waubic and Noronic.

St. John, N.B.—The spirit of the old time wrecker still lives, as is shown by the looting of the C.P.O.S. steamer "Corinthian," ashore in the Bay of Fundy. When Capt. Walsh, marine superintendent of the C.P.O.S., arrived at the wreck, he found about 100 motor boats, whose owners were busy removing everything from the ship that was not too heavy to carry. These worthies evidently thought Capt Walsh and his steamer were rival pirates, for they very coolly ordered him away.

Montreal.—Navigation is continuing open much later this winter than was the case last year. The last steamer to leave the harbor last year was the War Castle, on the 7th of December. There were four ships of the United Shipping Board in the harbor on the 10th December, and four more in the canal. If the present mild weather continues, the port may be open for another week, but if a cold snap succeeds, a couple of days might see the close of navigation.

Cleveland.—With the sailing of the G. W. Pollock the last of the hard coal shipments from Buffalo to Lake Superior has been made. There is some hard coal on the market for Chicago, and a Cleveland steamer was placed for that port at 41, with the understanding that if a higher rate was paid, she would get it. Two steamers were offered for Lake Michigan at 41¼, but were not chartered, so they were ordered from Buffalo to Ohio ports to lay up.

Ottawa.—It is stated that one result of the investigation into harbor conditions at Vancouver, carried out by Mr. A. D. Swan, has been the recommendation of a dry dock. In connection with this it is rumored that application will shortly be made to Dominion Minister of Public Works by a strong company for leave to construct a dry dock at a cost of several million dollars. It is understood that the Lyall Shipbuilding Co. will be interested with other Vancouver firms.



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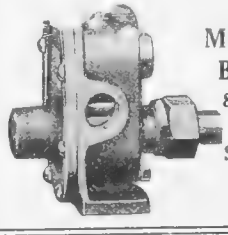

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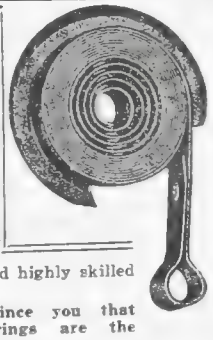

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SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
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ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

TOOLS & STAMPINGS

We have the equipment to make the tools and do the stamping. Let us quote on your requirements.

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Stamping and Tool Works
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Jacobs Drill Chucks

You are to-day trying to economize; Jacobs Chucks will help you. I stock them.

Give me a call on your requirements for Taps, Drills, Cutters, Reamers, Files, Hack Saw Blades, etc.

Everything for the Machine Shop.

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OUR REGULAR LINES OF

Milling Machines, Motor Driven and Belt Driven Grinders, Polishers, Disc Grinders, Swing Grinders, Hack Saws.

Our Engineering Staff is ready to advise on your problems.

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for all purposes
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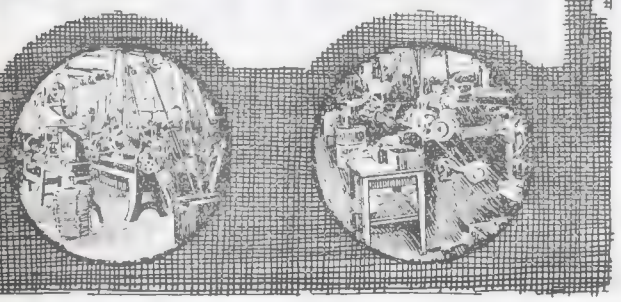

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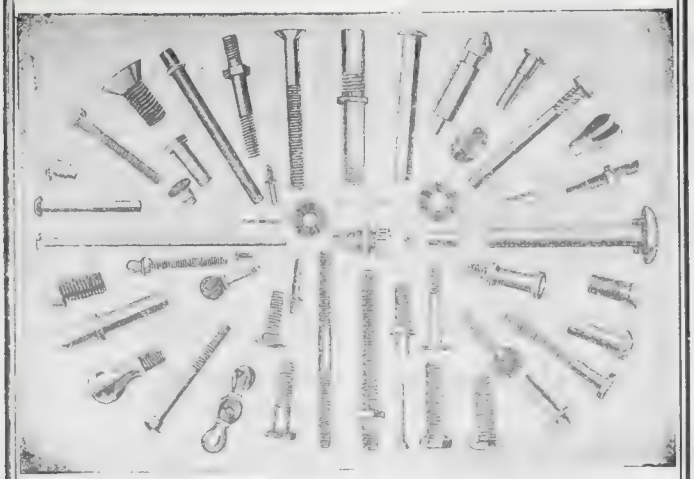

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You require *Expert Work.*

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Accuracy WE MAKE **SPECIAL EQUIPMENT** *Reliability*

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Welland Machine & Foundries, Ltd., Welland, Ontario

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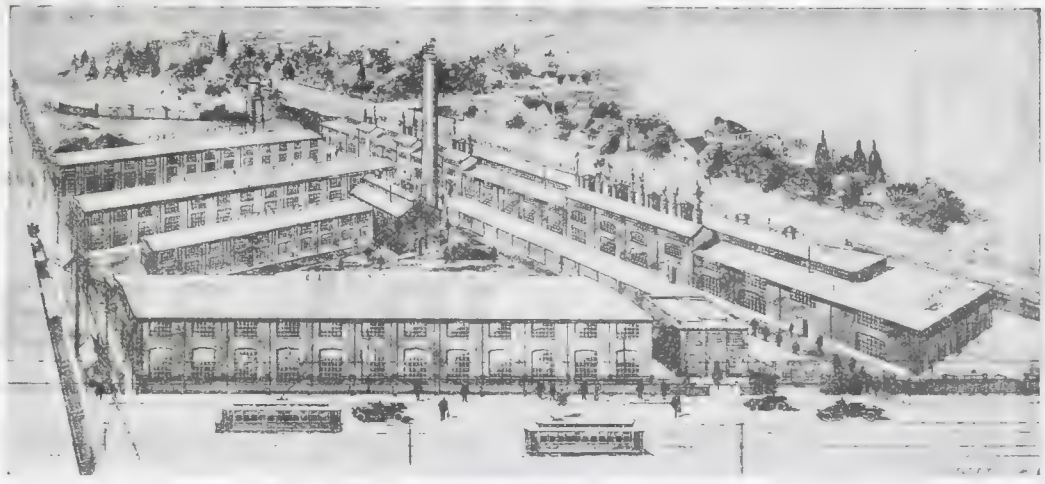

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"HISCO" will shortly have an increased capacity which will make it the largest foundry of its kind in Canada.
Two big new electric furnaces are being added to our present large equipment. And cleaning and annealing department measuring 300' x 100' is about to be completed.
This will place us in a position to handle orders big and small with unequalled facility.

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GEARS—Machine moulded, any size up to 18 feet without patterns.

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We are also prepared to furnish steel plate to 20" wide — for prompt delivery.

We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

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Machinery Castings of all kinds, Motor Frames, etc., for electrical trade, Pedestal and Miscellaneous Bridge Work, Rolling Mill and Blast Furnace Castings, Gears and Gear Blanks.

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The MacLean Business & Class Publications in Canada

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The Canadian Grocer (Est. 1886)
Serving the Grocery, Provision and Foodstuffs Trades. Published weekly.

Hardware and Metal (Est. 1889)
Serving the Hardware, Stove and Metal-working Trades. Published weekly.

Dry Goods Review (Est. 1889)
Serving the Dry Goods Trade generally; Wholesale, Retail, Manufacturing and Department Stores. Published monthly.

Men's Wear Review (Est. 1898)
Serving the Manufacturers of Clothing, Underwear, Shirts, Collars, Neckwear, Footwear, Hats and Caps and Allied Sundries, and their Retail Distributors. Published monthly.

Canadian Machinery (Est. 1905)
Serving the Machinery, Metal-working, Iron and Steel, Foundry and Allied Trades. Published weekly.

The Power House (Est. 1907)
Serving the Operating and Consulting Engineers and Power Superintendents, Devoted to the Generation, Transmission and Application of Steam, Gas, Electric, Air and Water Power; and to the operation of Refrigerating Machinery. Published monthly.

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Serving the Manufacturers of Sanitary, Heating and Ventilating Machinery, Systems and Equipments, and those installing them. Published semi-monthly.

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and SOME PRODUCER too

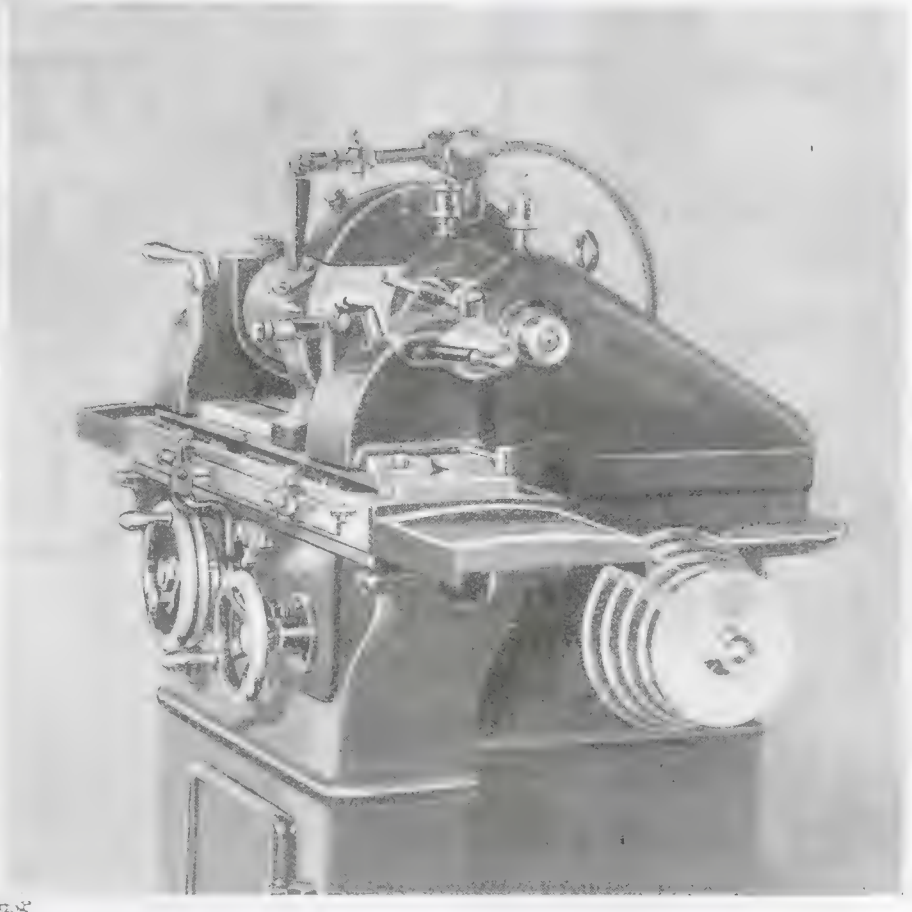

Illustration shows our 5" x 18" Plain Grinder.

It has automatic feeds, bearings of Non-Grain Metal, large self-feeding oilers and Hyatt roller bearings on the countershaft. It is especially adapted for the rapid and economical production of large quantities of small duplicate, straight or taper cylindrical parts requiring close limit grinding.

Fifty-seven varieties of work, more or less, from cast iron bushings to high-speed steel cutters, take their accurate finish from Ott Grinders; and the intitial machine in any plant—no matter what it makes—invariably recommends others.

It occupies but 31" x 68" floor space. Its production capacity is worthy of larger and costlier machines.

Let Us Send the Full Description

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If interested tear out this page and place with letters to be answered.

CUT YOUR CUTTING COST WITH VICTOR Flexibles

The high cost of tools should emphasize more than ever the importance of quality.

The high cost of hack saw blades ought to drive every hand blade user over to the saw that does not break in ordinary hand work.

VICTOR FLEXIBLE HACK SAW BLADES have exactly the same cutting power as the finest All-Hard on the market, and that they cannot be broken in use except by intentional abuse is an undisputable fact—which will represent a saving from twenty-five percent to thirty-three and one-third percent in breakage alone.

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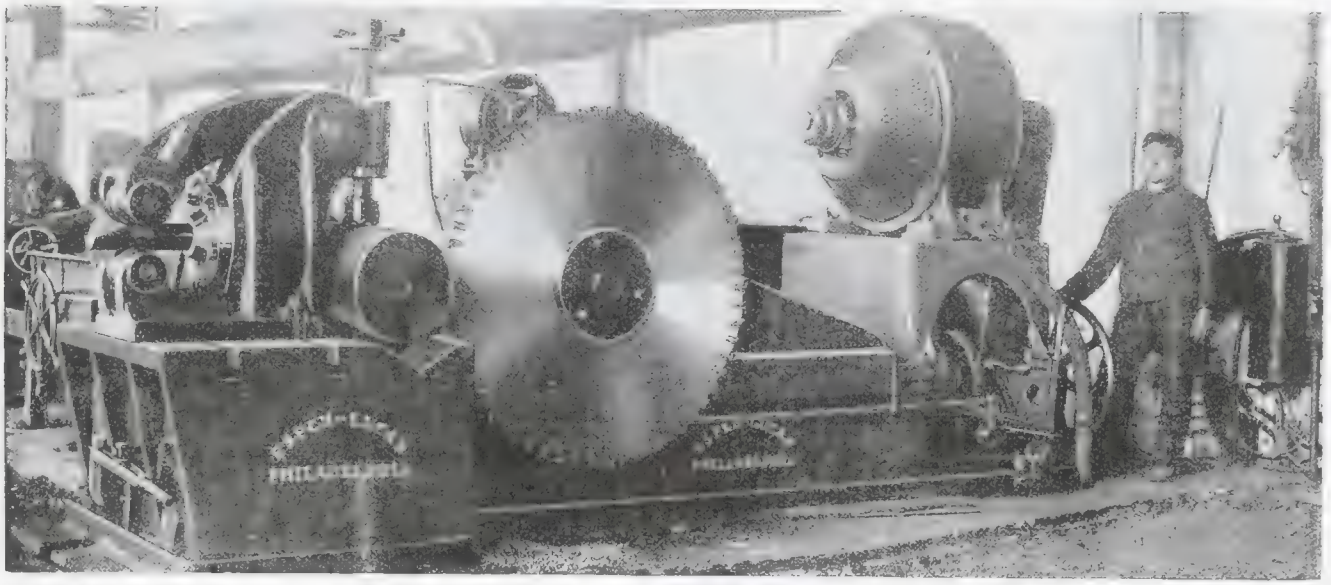
VICTOR SAW WORKS LTD - HAMILTON, CANADA



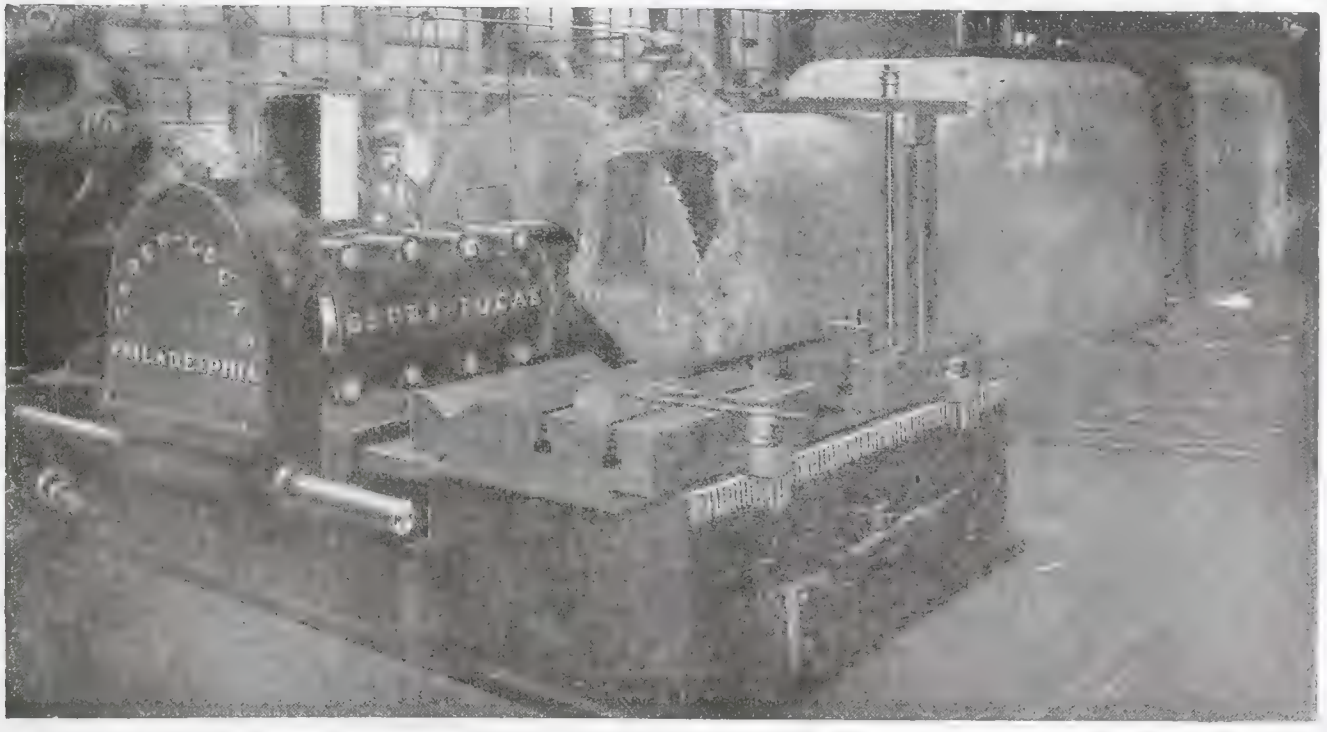


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Illustration of Cataract Quick Change Swing Precision Lathe, Raised to Swing 15 inches.

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QUICK-CHANGE PRECISION LATHE

Ideally designed for both ordinary and specially fine work. This Cataract lathe has accomplished so much in so many plants we'd particularly like YOU to know all the particulars of its unusual record.

Length of Bed .....52″
Total Length of Lathe .....65″
Distance Between Centres...28′
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Diameter of Front Cover.2 1-32″
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Length of Spindle .....15″
Hole through Spindle.....1¼″
Draw-in Chuck Cap.1″ maximum

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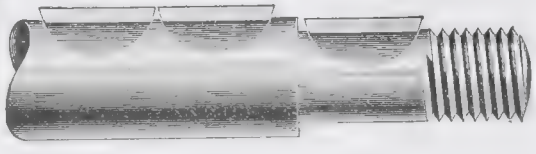
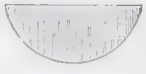
"WHITNEY" MACHINE KEYS

For the

Woodruff System of Keying



If you are not already using the "Woodruff System" write us at once. Remember that the operations of cutting the Keyseats and inserting the Keys require no skilled labor. Used by all manufacturers to whom economy, rapidity, and interchangeability are essential.



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If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
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or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

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If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

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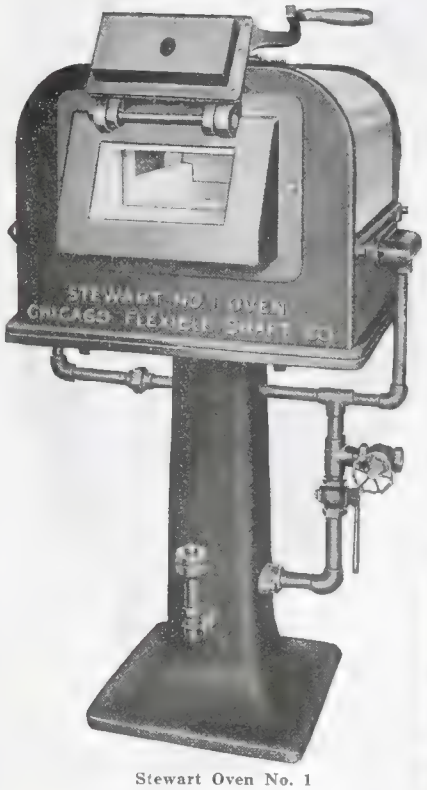
Precisely meet modern shop practice and steel heating requirements



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Gas or Oil Fired

Stewart Furnaces are either gas or oil-fired, and construction is such that an even temperature control is possible at all times.

And you shut off the Gas or Oil when you are through with the heat—you can no longer afford to do your heat-treating by coke or coal—it is far too risky, costly and inefficient.

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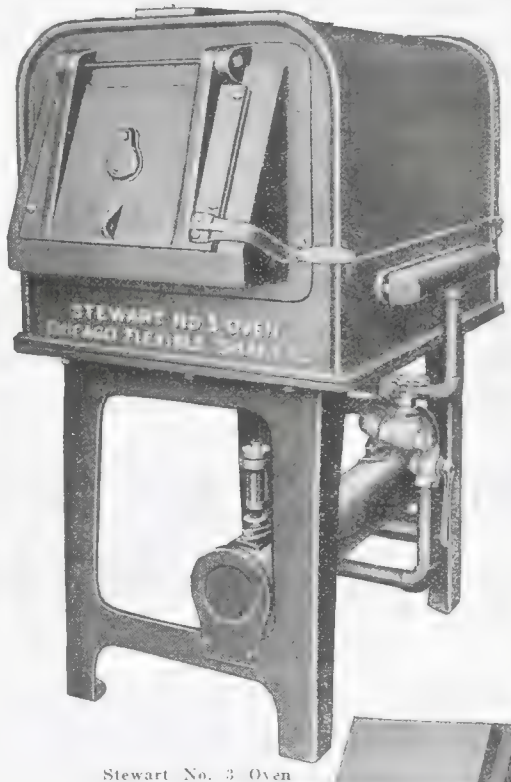

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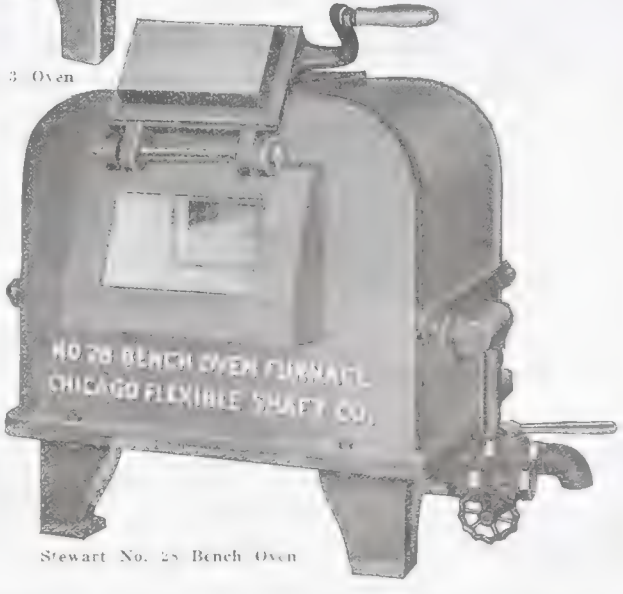
TEMPERATURE controls the vital factor in successful heat treatment of metals. If you have no positive control you cannot be certain of results. STEWART FURNACES GUARANTEE POSITIVE CONTROL. Put any kind of heat-treating work up to Stewart Furnaces and it will be done precisely as you require it.



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Canadian Distributors:

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TORONTO OTTAWA MONTREAL

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CHICAGO, ILL.

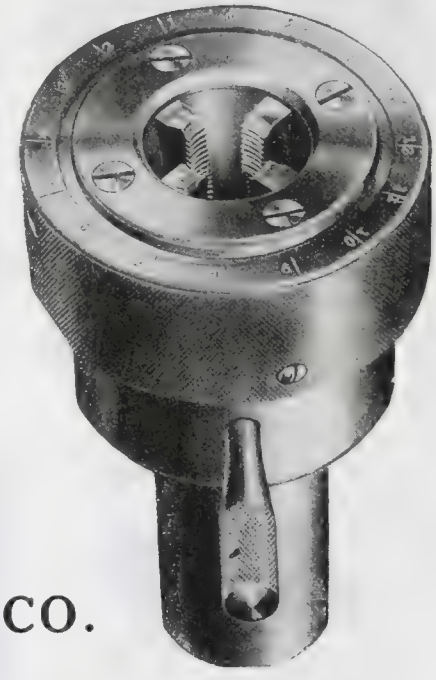
The Murchey Way!

The "Murchey Way" is to keep well in advance in the matter of all things pertaining to the **accurate** production of their well-known **Collapsing Taps** and **Self-Opening Dies.**

Every tool that comes out of the Murchey shop is the very best that modern machinery, modern ideas and years of experience can make it.

Murchey Taps and Dies last longer, do better and quicker work than ordinary tools. They combine cost-cutting feature seen on no other tools of their kind.

Sixteen years of experience in making Collapsing Taps and Self-Opening Dies places us in a position where we can make valuable suggestions on special threading tools. Write.



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The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
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Here's Hoping the Best of Luck And a Happy New Year

We are going to build many good Cisco Lathes for our Canadian friends this year. The same good lathes we have furnished in the past. If we can, we will make it better, but you can always count on it being accurate, strong, rigid and effective.

The Best Lathe Ever Built

That's our claim, and some time you will agree with us. Best in satisfaction; best in economy; best in lasting results. They're built in 14", 16", 18" and 24" sizes.

WILLIAMS SELLS
The Lathe with the Pull
The Lathe of Simplified Accuracy

Made by

The Cisco Machine Tool Co.

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Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on 5/8-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

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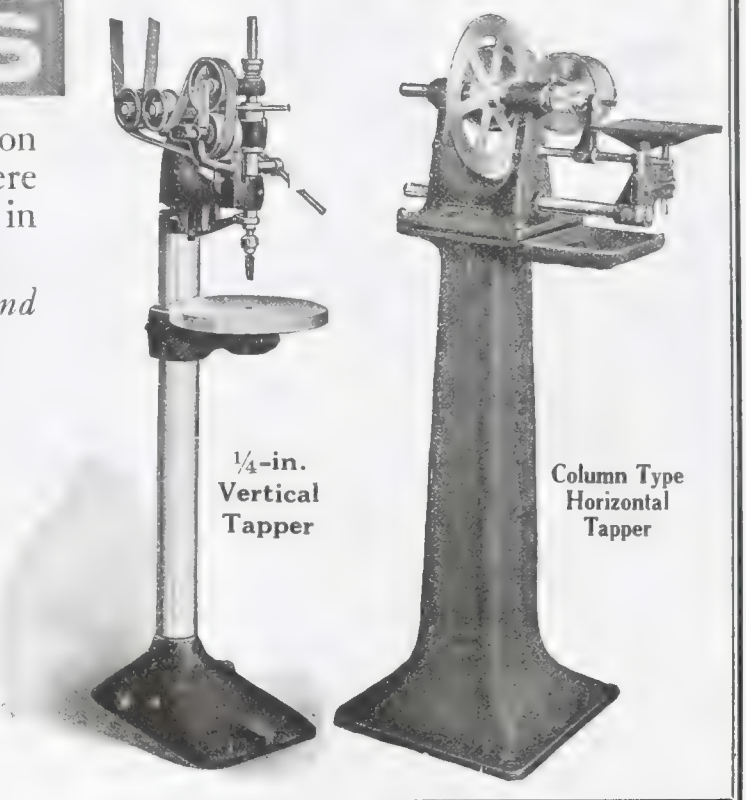

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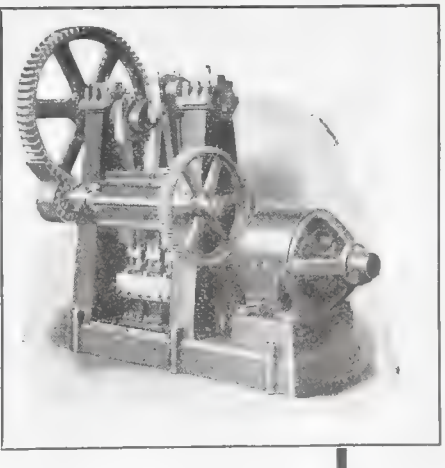

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Elm Cutting Oil will not only enable you to speed up your production and get clean-cut threads, but eliminates repeats and greatly lessens the breakages of dies. **Once known, always used.**

ELM MOTOR OIL

Another quality line. Absolutely carbonless and reduces friction. Maintains its body regardless of temperatures. Made in three grades: light, medium and heavy. Get acquainted with something really good. Try it.

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Quadrupled Driving Gears

and driving mechanism of great strength and weight insure **power**; and the wide, extra heavy housings extending to the floor and secured to bed by tongue and groove joints in addition to bolts and dowels insure **rigidity.** It is this power and this rigidity that **make "Hamilton Planers,"** 48" x 4o , rapid producers on heavy precision work. For more particulars

Rapid Production HAMILTON Machine Tools

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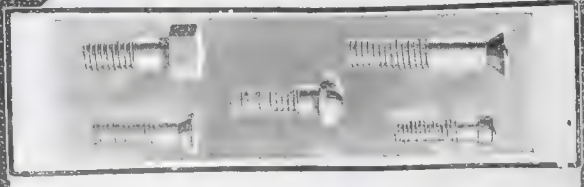
Wood Screw Making Machinery

SEND FOR CATALOGUE
Series B6



For sixty years we have constantly manufactured machinery for making screws, always studying to improve and refine our product.

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Cable address: "Cook," Hartford, U.S.A.

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High Grade
Crucible and Electric Tool
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Equipped to Meet all Demands

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Made from Special Chrome Vanadium for Shell Piercing

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All Classes

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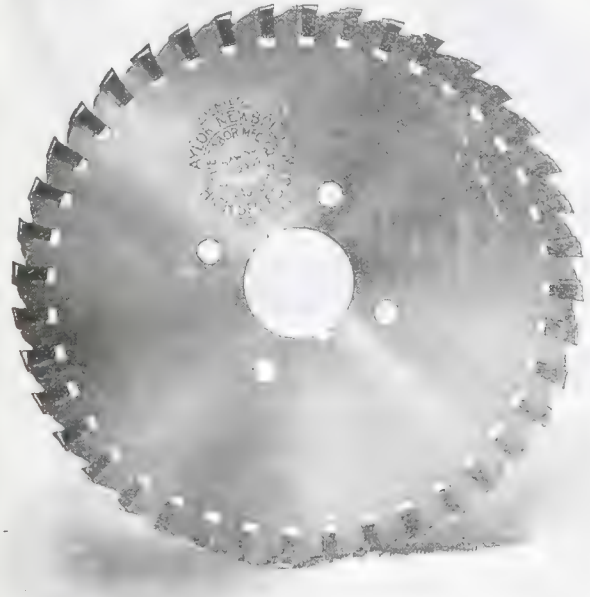
TAYLOR-NEWBOLD



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WRITE FOR BULLETIN T-S
Tabor Mfg. Co., Philadelphia, U.S.A.

Electric Steel Castings

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BRAND
Stands for Quality

High Grade Steel Castings
Of Every Description
For Bridge, Dock and Harbor Construction
Machinery Steel Castings, Etc.
Manganese Steel
Crusher Jaws, Check Plates, Toggles, Granite Rolls, Ball Mill Wearing Parts, Tube Mill Wearing Parts.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
WELLAND ONTARIO

Conserve Labor

Everyone possesses some degree of energy. That energy expressed is **labor.** Without **labor** the world would suddenly stand still. Production of any kind would be absolutely impossible. Humanity would perish.

Labor is, and will continue to be scarce.

Labor is costly.

Expenditure of **labor** through inefficient methods is a waste not only of **labor,** but of time and money, all of which should be expended more profitably.

BOWSER ESTABLISHED 1885
SYSTEMS THE STANDARD ALWAYS

for the storing and handling of oil and gasoline will conserve

70%

of the **labor** necessarily expended by less efficient methods.

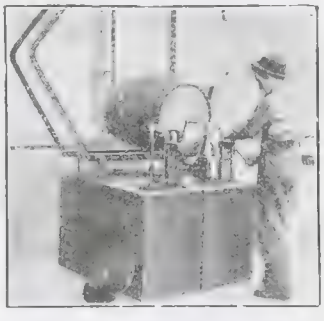
They also conserve –

Time	**Machinery**
Space	**Lives**
Capital	**Property**
	Material

BOWSER ESTABLISHED 1885
SYSTEMS

ARE

Leak-proof
Loss-proof
Fire-proof
Dirt-proof
Deterioration-proof
Evaporation-proof



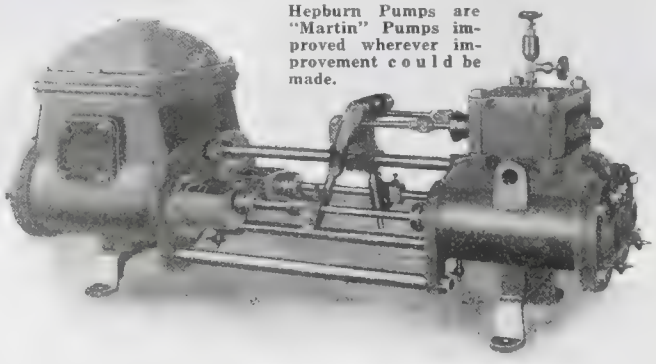
An inquiry carries no obligation whatever. Let us help you **conserve labor.**

A System for every requirement.

S. F. BOWSER & COMPANY, Inc.
TORONTO, ONTARIO
Sales Offices in All Centres Representatives Everywhere

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED
18-60 Van Horne Street Toronto, Ontario

ROTARY GEARED PUMPS

The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

Let us send a sample pump free of charge—to prove that Trahern Geared Pumps are preferable.

Trahern Pump Company
ROCKFORD, ILLINOIS
Canadian Agents :
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Change the Metal Shapes You Cut---

as often as you will. You can saw them all with a 10-tooth, 18-gauge Star Power Blade without changing the blade except for very thin or very heavy work. You can do this with the Star because it is the standardized blade that cuts the widest range of shapes and metals. This standardized service is made possible by the cutting angle, clearance and strength of teeth of the Star Blade and by its higher percentage of Tungsten and greater toughness of steel.

Don't use a saw that requires constant shifting of blades every time you change your work. Constant change of blades means lost motion, lost time and lost money—and the inevitable wrong blade selection adds still further to the cutting loss.

STAR HACK SAW BLADES

made of Tungsten Steel

Machine and Hand

Frederick Taylor and the other authorities on metal cutting are all agreed that a standardized tool is the basis of metal cutting efficiency. Hack saws with a multiplicity of gauges and pitches are wrong in theory and practice.

Once you try the standardized Star Blade you will never be satisfied again with the ordinary blade with its confusing number of gauges, pitches and sizes. You will appreciate the time-saving convenience of the Star and realize that its faster cutting and longer cutting give you a far lower cutting cost which after all is what you are buying.

The most efficient plants of the country, such as

Flexible and All Hard

Bethlehem Steel, Standard Oil, Fore River Shipbuilding, Thomas A. Edison, Inc., and Pennsylvania Railroad are Star Blade users.

You, too, will be a Star user when you find out all the facts.

Our Engineering Service on metal cutting is at your service no matter what blades you are using. Put your problems up to us and let us help you. Write for "Hack Saw Efficiency." It is a valuable handbook for anyone who cuts metal. Free on request — 230 River St., Millers Falls, Mass.

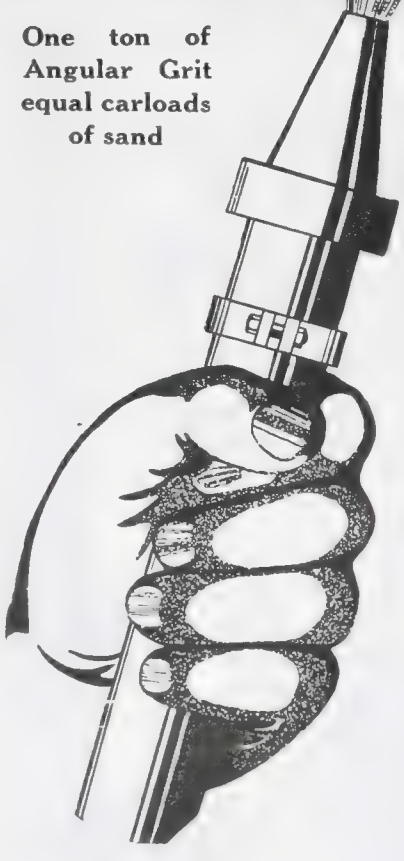
Manufactured By
CLEMSON BROS. Inc.
MIDDLETOWN, NEW YORK

Sole Distributors
MILLERS FALLS CO.
MILLERS FALLS, MASS.

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

One ton of Angular Grit equal carloads of sand



Quicker and Better

ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations—best materials for cleaning shells. Prove its superiority by giving it a trial.

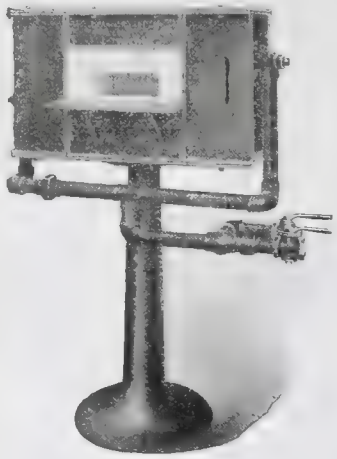
Pittsburgh Crushed Steel Co.
Established 1888
Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.



Red [End Furnace or Cutting Tool Type

For
Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting
Shell Types

Furnaces built for special requirement

TORONTO OFFICE:
Standard Fuel Engineering Co.
W. H. KIRK, Manager
909 Excelsior Life Building
Phone Main 385

STANDARD FUEL ENGINEERING CO. DETROIT, MICH.

USED STEAM ENGINES
FOR SALE

One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

Diameter of Cylinder	**28″**
Length of Stroke of Piston	**48″**
No. of Revolutions per minute	**75**
Fly Wheel	**18′ x 12½″ Face**
Weight	**40,000 lbs.**
Rated Horse Power	**625**
I. H. P.	**700**
Max.	**950**

One 25″ x 50″ Left-Hand Wheelock Engine.
One 20½″ x 46″ Left-Hand Wheelock Engine.

These engines are in excellent condition.

Photograph and full particulars will be sent on application to

GUTTA PERCHA & RUBBER
LIMITED
Toronto, Canada

Philadelphia GEAR Works

VINE STREET PHILADELPHIA, PA.

Spur, Bevel, Herringbone, Spiral and Intermittent

Gears and Pinions

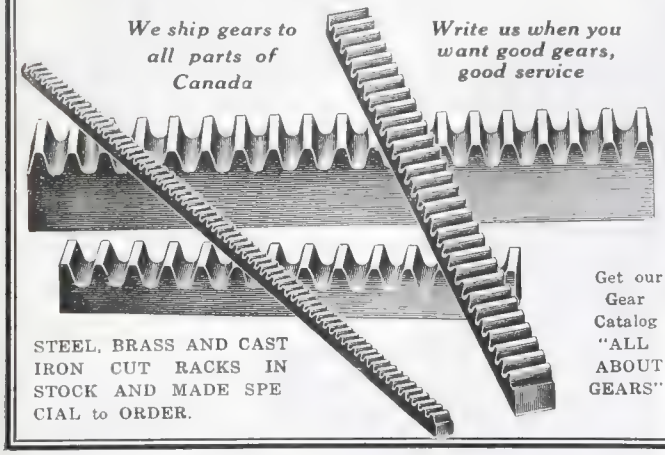
Made in all kinds of metals, rawhide and fibre

SPROCKET WHEELS made to order.

DIAMOND CHAINS for Power Transmission, Machinery, Motor Trucks, Motorcycles and Bicycles.

We ship gears to all parts of Canada

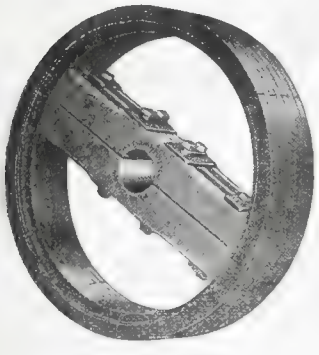
Write us when you want good gears, good service



STEEL, BRASS AND CAST IRON CUT RACKS IN STOCK AND MADE SPECIAL to ORDER.

Get our Gear Catalog "ALL ABOUT GEARS"

BERNARD



Wood Split Pulley

With greatest care we select and treat the materials to be built into the BERNARD WOOD SPLIT PULLEY. It is bound to give you entire satisfaction for years. Write for price and service particulars.

The A. Bernard Industrial Co.

Manufacturers of High Grade Power Transmission Appliances

Office and Works: **Fortierville, Que., Canada**

Carried in stock by

The General Supply Co. of Canada, Ottawa and Winnipeg
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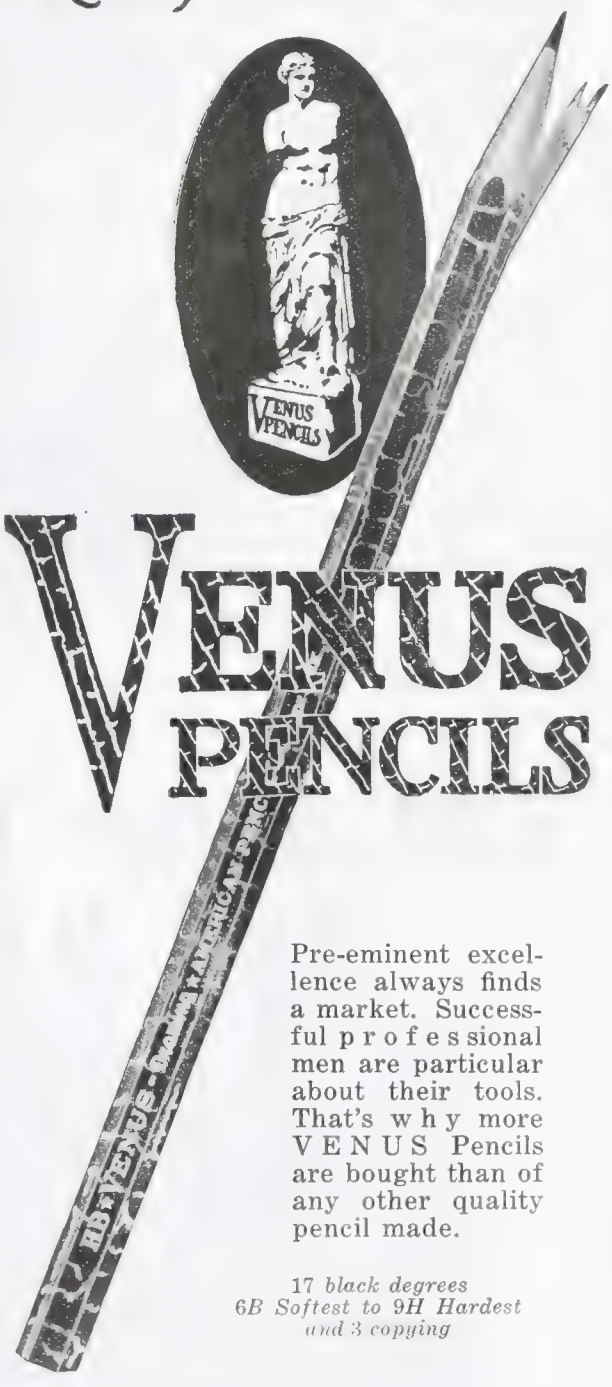
The Largest Selling Quality Pencil in the World



VENUS PENCILS

Pre-eminent excellence always finds a market. Successful professional men are particular about their tools. That's why more VENUS Pencils are bought than of any other quality pencil made.

17 black degrees
6B Softest to 9H Hardest
and 3 copying

Special 14c. Offer

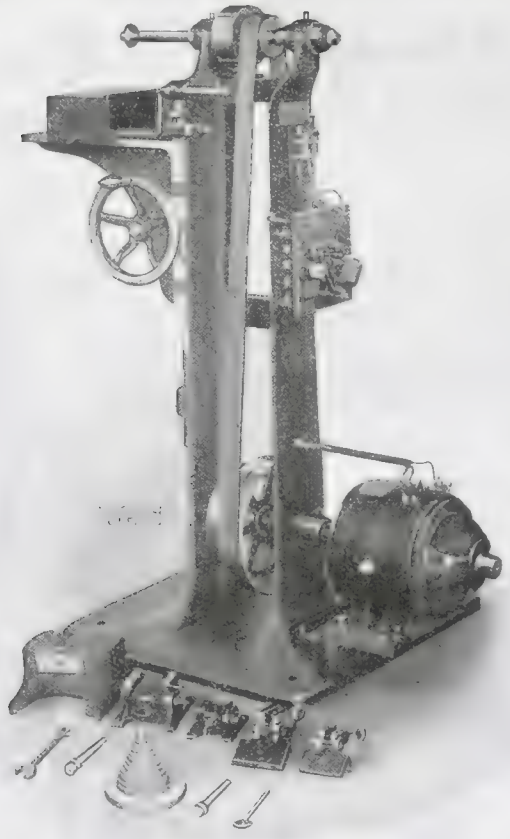
Send 14 cents in stamps for 3 trial samples, mentioning degrees you want. After you find how perfect VENUS Pencils are, buy them regularly at any dealer.

American Lead Pencil Co.

238 Fifth Avenue, New York

also Makers of the famous Velvet Pencil

If any advertisement interests you, tear it out now and place with letters to be answered.



The "MODERN" Die Chaser Grinder

Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**
Made for belt drive or a complete motor-driven unit. Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Taps, Hobs, Spiral and End Mills, Milling Cutters, etc.; can be furnished with the regular equipment.

For Fast Accurate Work

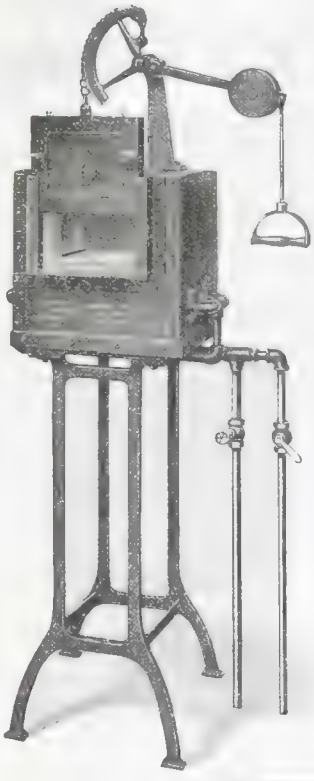
Bulletin C. G. will give you full details.
We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

Modern Tool Company

Main Office and Works: State and Peach Streets, Erie., Pa., U.S.A.

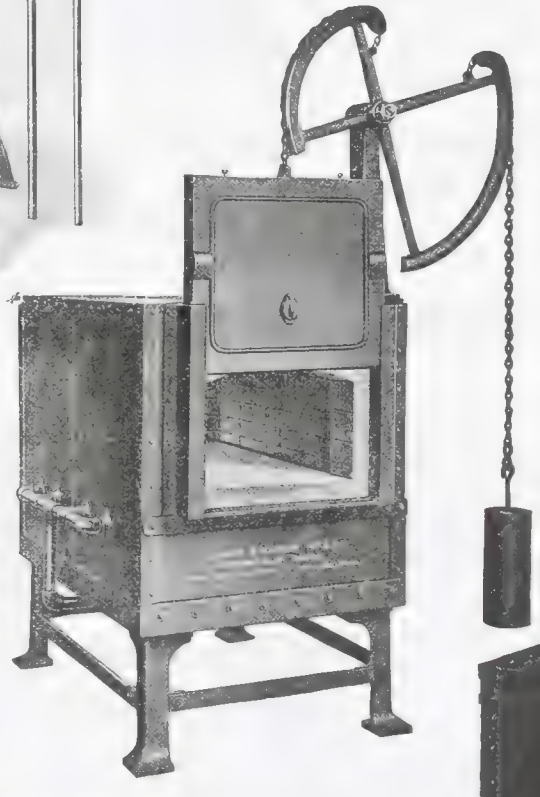
Canadian Agents: Rudel Machinery Co., Toronto and Montreal

New York Office: - 50 Church Street
Chicago Office: - 32 N. Clinton Street
F. Wesley Parker, Resident Engineer and Export Agent, 2 Rector Street



Gilbert & Barker Furnaces

For Immediate Deliveries



WHEN you require a heat treating furnace delivered to you promptly specify G. & B. in your order. Extensive manufacturing facilities enable us to keep ahead of the demand and you can secure certain standard types of furnaces for hardening and tempering directly from our stock.

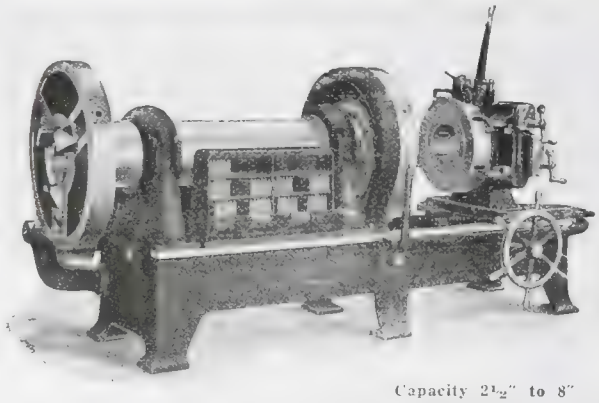
G. & B. Furnaces Assure You 100% Efficiency In Heat Treating

The "C" type—especially designed for hardening taps, dies, milling cutters, etc., may be had in two sizes; one has a heating chamber 24 x 36 x 12 in. and the other 25 x 58 x 12 in.

The "K" type meets every requirement in the heat treating of high speed steels. Despite the fact that temperatures up to 2,600 deg. Fahr. may be obtained and maintained uniformly this furnace rates very low on fuel consumption.

Enquiries Promptly Answered

Gilbert & Barker Mfg. Co.
WEST SPRINGFIELD, MASS.
Canadian Agents: Williams & Wilson, Montreal, Que.



Capacity 2½" to 8"

15 Distinctive Hall Features

1 Single Pulley Drive, through.
2 Dodge Friction Clutch, on machine.
3 Clutch Lever at operator's left hand.
4 Rigid Bearing Brackets on drive shaft.
5 Gear Box Drive away from operator.
6 Individual Adjustment for each bearing.
7 Large Spindle Bearings are ring oiling.
8 Compact Control Levers on operator's side.
9 Large Die Cabinet and Tool Tray.
10 Substantial oil trough around top of ways.
11 Specially constructed reservoir and filter.
12 Low-down Sliding Head.
13 Rotary Geared Pump reversible for left-hand thread.
14 Specially designed Carriage to drain off oil and cuttings.
15 All Gears amply protected.

THE HALL GEAR BOX DRIVEN—Duplex Improved Pipe Threading Machine

Heavy duty Construction, Economical Up-keep, Radial Production, Perfect Threads, Workmanship and Finish Unsurpassed. All sizes—⅛" to 18".

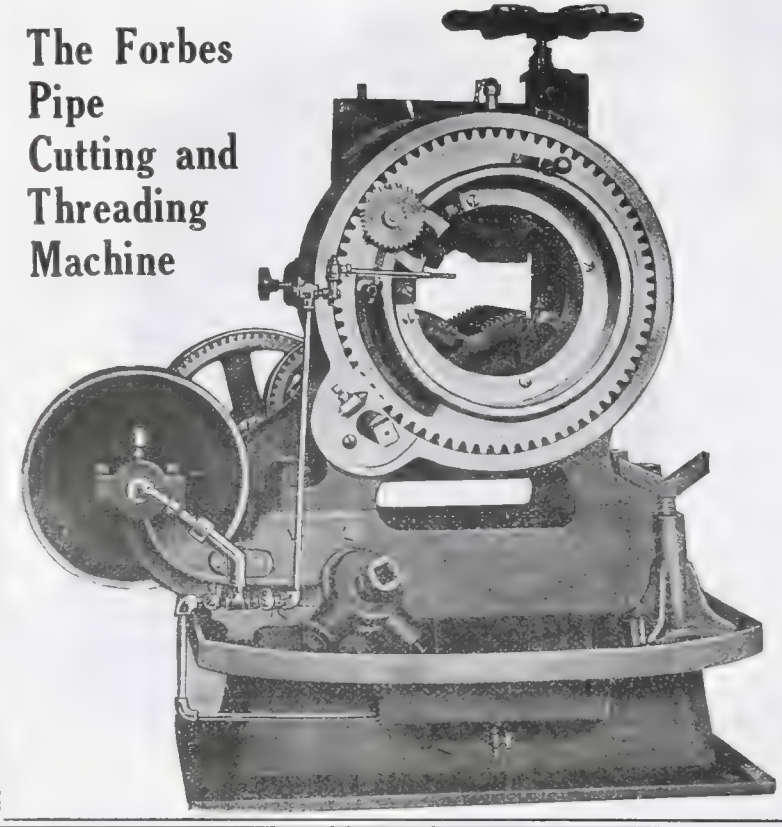
Pipe Threading Machines, Nipple Machines, Roller Pipe Cutters Special Machinery

Catalogue and Prices on Application

JOHN H. HALL & SONS, LTD., Brantford, Can.

CUTS THREADS FAST, CLEAN and TRUE

The Forbes Pipe Cutting and Threading Machine



One man can do the work of six against old Stock and Die method of cutting

These are not exaggerated statements—they are facts that are being proven every day by Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its labor-saving, perfect-working value.

Inexpensive to Operate

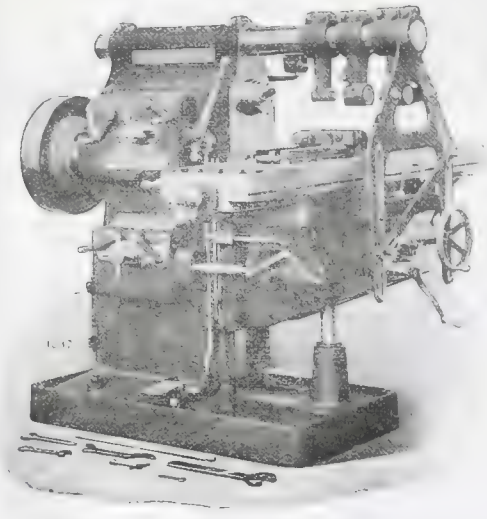
It is simple, compact, self-contained, and all wearing parts are adjustable. One man can operate it and for heavy pipe work it can be taken right to the job. Fitted with self-centering vise that holds the heavy pipe stationary, while the dies turn around it. The latter are clamped and released by a throw of the lever.

Write for our latest bulletin giving full details

THE CURTIS & CURTIS CO.

Garden Street, Bridgeport, Connecticut, U.S.A.

Cincinnati High Power Millers



One of our 9 High Power Single Pulley Plain Millers. We also make 9 cone driven plain machines, and a full line of Universals.

Unusual Spindle Power

Heat Treated Alloy Steel Gearing for the Spindle Drive

Flanged Spindle End

which makes Face Milling Cutters Interchangeable in all sizes of Machines

Handy and Easy to Operate

These are some of the reasons why you should use

Cincinnati High Power Millers

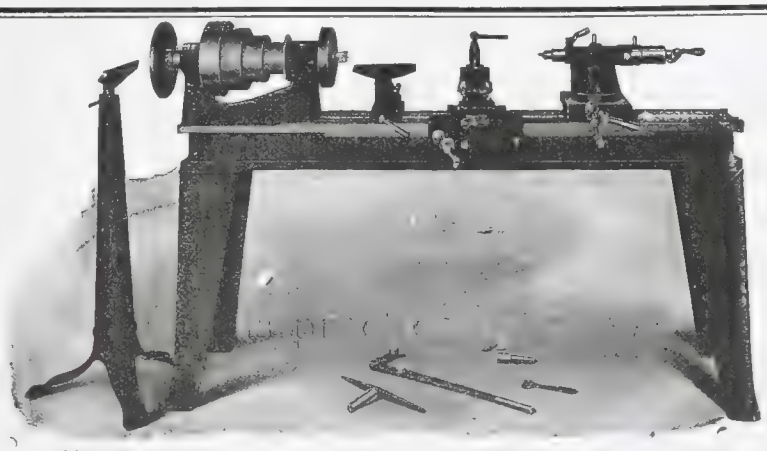
ASK FOR CATALOGUE

The Cincinnati Milling Machine Company

CINCINNATI, OHIO

Canadian Agents.:

Taylor Engineering Co., Ltd. - Vancouver, B.C.
H. W. Petrie, Ltd. - - - Toronto, Ont.
H. W. Petrie, of Montreal, Ltd., Montreal, Que.
General Supply Co., of Canada, Winnipeg, Man.



A Favorite—

Blount Pattern-makers' Lathe

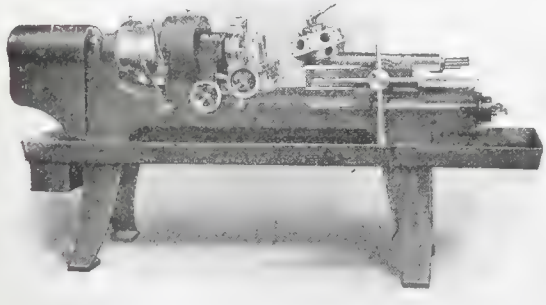
FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

THE TILTED TURRET

A CLEAR TRACK FOR THE STOCK



INVESTIGATE!

SEND FOR

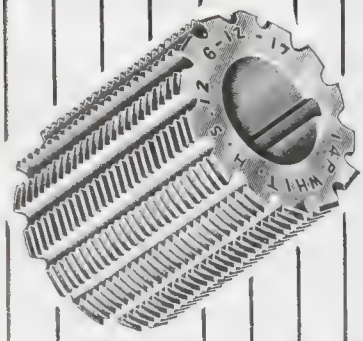
CATALOG "C"

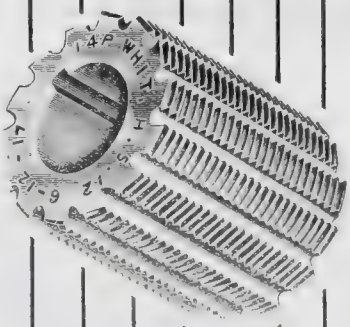
OR

ASK THE USER

FIFTEEN YEARS OF SATISFIED USERS

WOOD TURRET MACHINE CO
BRAZIL INDIANA U.S.A.





Butterfield

TWIST DRILLS GEAR AND MILLING CUTTERS

(Carbon and High Speed Steel)

Quality

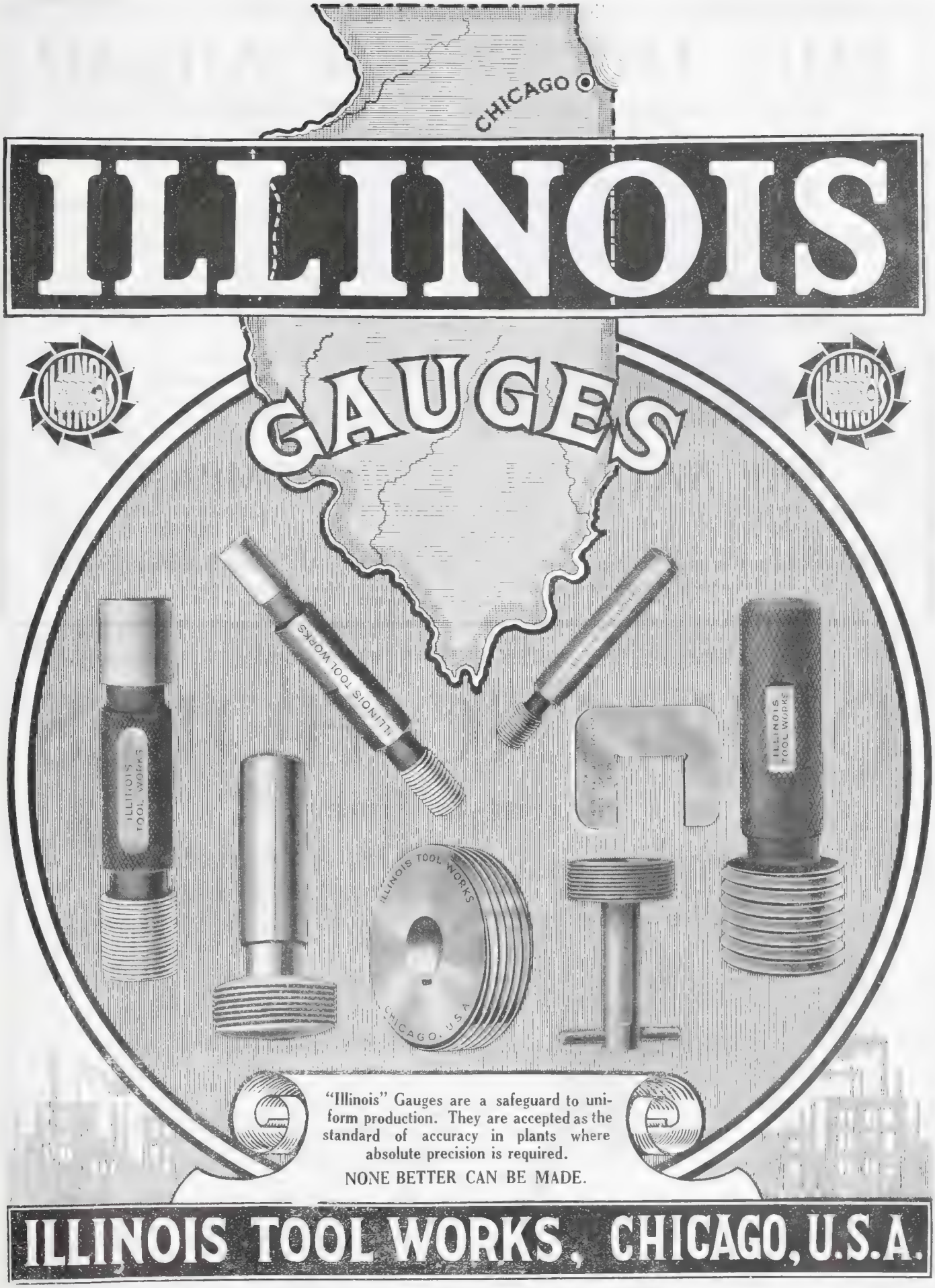
Prompt Delivery

They're the happy result of a great combination of specially trained men and the finest special machinery—these Butterfield carbon and high-speed steel Twist Drills, Gear and Milling Cutters, Side Mills and End Mills, with straight or spiral flutes and plain or nickeled teeth. Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers — the sincere praise of a thousand users wouldn't be a better recommendation.

The Butterfield Catalog, just off the press, fully describes these better tools and how they increase production. Write for your copy.

Butterfield & Company, Inc. - Rock Island, Quebec

Toronto Office: 220 King Street West



"Illinois" Gauges are a safeguard to uniform production. They are accepted as the standard of accuracy in plants where absolute precision is required.

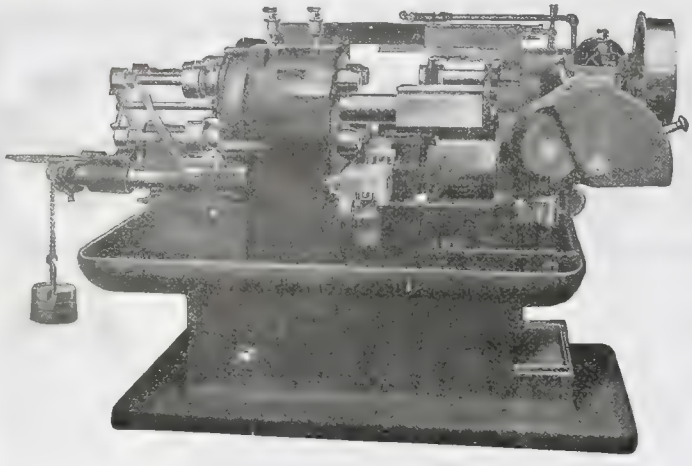
NONE BETTER CAN BE MADE.

ILLINOIS TOOL WORKS, CHICAGO, U.S.A.

Detroit Store, 997 Woodward Avenue. Represented by Lewis G. Henes, Monadnock Building, San Francisco, and Title Insurance Building, Los Angeles.

FOR THE WORK AHEAD

WHY NOT GRIDLEY AUTOMATICS?



To meet the production demands that are ahead of you, you will need more automatic machines.

The use of Gridley Automatics means continuous production of accurate parts—less dependence on a limited labor supply—satisfactory filling of orders.

Isn't it the kind of production that **you** desire?

Let us quote production of your work from samples or blue prints.

Capacities:

Multiple Spindle.....up to 2⅝″ diam.
Single Spindle .....up to 5″ diam.

THE NATIONAL ACME COMPANY

GENERAL OFFICES CLEVELAND — WINDSOR, VERMONT — CANADIAN SCREW PLANT MONTREAL, P.Q.

BRANCH OFFICES

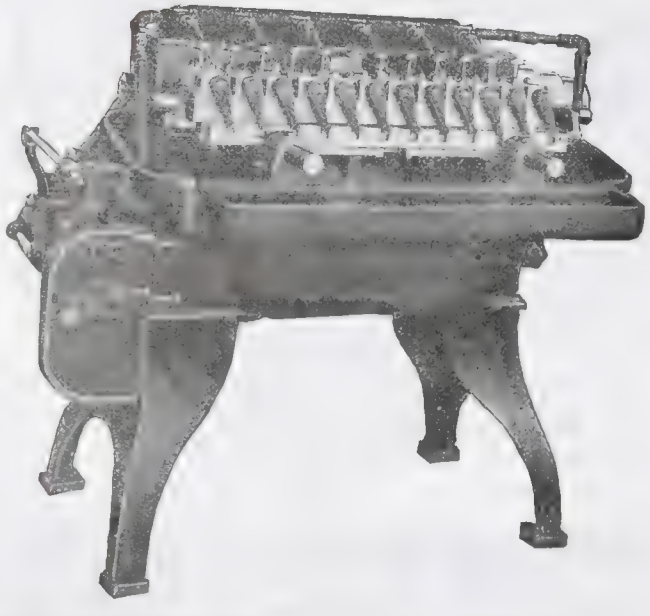
NEW YORK BOSTON CHICAGO DETROIT ATLANTA SAN FRANCISCO

WAREHOUSES: NEW YORK AND CHICAGO — FOREIGN REPRESENTATIVES

Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio

DRILLING HOLES

Six at a Time



On a Namco Six Spindle Driller

Continuous operation is effected by the use of twelve holding chucks, and six pieces are drilled while six are extracted and replaced. All operations are **fully automatic** except feeding the pieces.

Fast and continuous drilling means lowered costs per piece.

Quotations on **your** work. Capacities up to ¼″ drill.

THE NATIONAL ACME CO.

New England Plant Windsor, Vt. — CLEVELAND, O. — Canadian Screw Plant Montreal, P.Q.

Branch Offices:

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Warehouses—New York, Chicago. With Foreign Representatives.

Makers of Gridley Single and Multiple Spindle Automatics at Windsor, Vt. and Acme Automatics, Threading Diess Collapsing Taps and Screw Machine Products at Cleveland, Ohio

ESTABLISHED 1860

Sole Canadian Rights to Manufacture the

"HYDE"

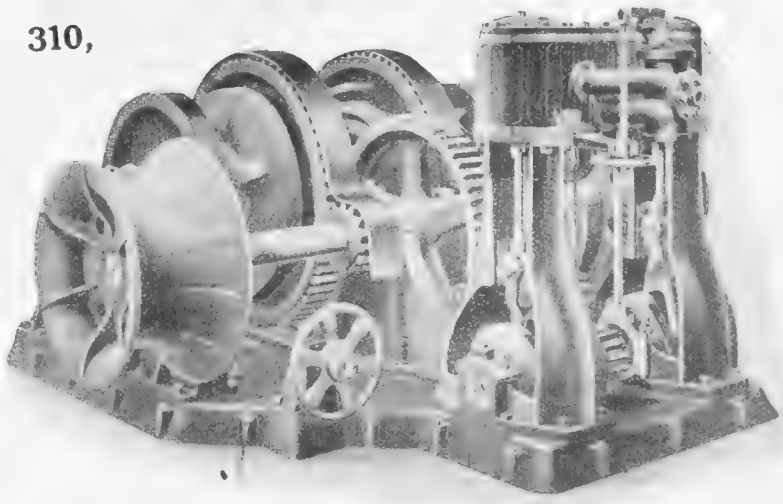
Anchor-Windlasses

Steering-Engines

Cargo-Winches

Which have stood the test of 50 YEARS

310,



The "HYDE" Spur-Geared Steam Windlass

Propeller Wheels

Largest Stock in Canada.

Heavy Gears,
Mill Repairs,
Water Power
Plant Machinery

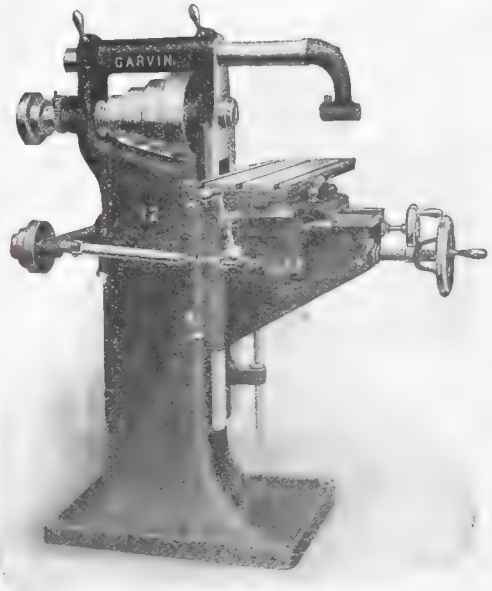
Steel Castings

Manufactured by

The Wm. Kennedy & Sons, Limited

Owen Sound, Ontario

GARVIN



No. 12 Plain Milling Machine - Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rapidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....**18 x 6 x 15 in.**

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City

The PHOTOSTAT—A Thrift

TRADE-MARK REGISTERED

The Troy Laundry Machinery Co., Chicago, says:

"Our machines going to the United States Army 'over there' must be transported 'knocked down.' That means setting them up by inexperienced men upon their arrival 'at the front.' What suggested itself as a real problem has been solved easily by the PHOTOSTAT—and has eliminated lost time, motion, and labor for the soldiers who do the 'setting up.'

"We make photographic copies of all parts—and their assembly. Then the soldiers merely take these photographic copies as a set of directions—and the job is completed in no time.

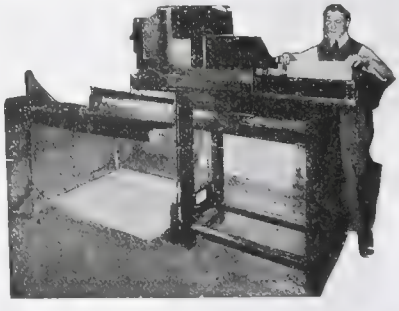
"But this is just one use we make of this real efficiency device. Here are a few others:

1. Specifications from the Government.
2. Samples of inventions to be tried out in our factory.
3. Parts of catalogs—which would take a stenographer hours to copy.
4. Cuts of machinery that are sent with bids.
5. Parts to be repaired when the original part can't be spared.
6. Posters from the Government reduced and sent to salesmen for advertising.
7. Illustrations for wiring in setting up machines.
8. Letters containing contracts.
9. Blue prints and tracings.

"We hope in the near future to use the machine for all routine work of the factory."

The PHOTOSTAT, which is manufactured by the Eastman Kodak Co., is a combined camera and copying machine. The copy is made directly onto a roll of paper. No intermediate glass plate or film or other negative has to be made. By copying thus directly onto the paper, the copy is made very quickly and at a low cost. Also the copy is a facsimile of the original, so that there can be no mistake in it. The print is developed and fixed right in the apparatus itself; this part of the process, as well as the focusing and exposing, all being mechanical. The print is then removed to a tank of running water, in which it is washed free from chemicals. Finally the print is taken from the water and dried and is then ready for use. The whole process is a rapid one, the average speed per print being from one to five minutes.

The PHOTOSTAT makes rapid, inexpensive and facsimile copies of Pencil Drawings, Ink Drawings, Tracings, Blue Prints, Maps, Sketches, Documents, Letters, Telegrams, Specifications, Data Sheets, Tabulations, Record Cards, Pages from Books, Insurance Records, Shipping Lists, Reports, Contracts, Illustrations for Salesmen, Cuts and Drawings for Advertising, etc., etc.



This cut shows the operator examining copy of a 36-in. drawing which he has just made in less than a minute.

A small book giving detailed description will be sent to you upon request to the

COMMERCIAL CAMERA COMPANY

ROCHESTER, N.Y.

Chicago, Ill. Philadelphia, Pa. New York, N.Y. Providence, R.I. Washington, D.C.

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ALFRED HERBERT, LTD., COVENTRY, ENGLAND
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...ecided that Haub... been injured in the perform... his duties.

While working for a firm of contractors, Sam Divota, of 20 Merle street, was struck in the eye by a piece of steel which flew up when he was using a pickaxe. The sight of the eye was lost, and Commissioner Phillips made an award of $1,477.12, covering a period of 128 weeks, payable bi-weekly.

For a lost thumb, Mike Somik, employed by the New York State Railways, was awarded $589.40 for 60 weeks, payable weekly.

Clyde W. Walbridge, working in the Pennsylvania shops at Elmira, has been awarded compensation for 128 weeks, totaling $2,314.24, payable weekly, for the loss of right eye. Walbridge was drilling holes in an iron girder to be used in a bridge on the company's lines when the drill caught and particles flew in his eye, destroying the sight. An interesting feature of the case is that Walbridge had a pair of goggles in perfect order with him at the time, but had neglected to put them on. He was awarded compensation only because the law does not take this sort of neglect into consideration.

Insist THAT YOUR MEN WEAR STOCO SAFETY GOGGLES

Accidents are always costly—nowadays they are also unpatriotic.

You can minimize the dangers to eyesight in your plant by using the Stoco Safety Goggle. It has exclusive protective features that insure safety and comfort for your men.

Best of all, you'll find your men will wear it without protest. The broad bearing surfaces make it easy to wear and the easy, flexible bows will not cut the ears. Also supplied with headbands if wanted.

If you are not familiar with the Stoco Safety Goggle, send for free trial sample and give it a trial.

STANDARD OPTICAL CO. GENEVA, N.Y.

THE "NEW" MACLEAN'S

Starting with the January issue, MACLEAN'S MAGAZINE comes out in a new size—11 x 14¼—same size as *The Saturday Evening Post.* This change will enable us to give readers more entertaining articles and stories, and a very much enlarged "Review of Reviews" Section. You will find this January issue of MACLEAN'S more pleasing and instructive than the great majority of magazines you find displayed on news-stands—and

contents are carefully censored—no sex stories—you can take it into your home with the utmost confidence.

A word about the contents—

"Why Laurier Will Wait"

In discussing the policy of the Liberal leader during the coming session of Parliament, J. K. Munro predicts, in January MACLEAN'S, that Laurier will allow Union Government a free hand. In this policy of inactivity "he sees the way open to the accomplishment of all his purposes. If he is half the politician his friends believe he is, he will sit and smile and wait—yet a little longer."

All Canada is interested in what is going to happen in Ottawa. J. K. Munro, veteran press gallery man, is a shrewd observer, and his political articles in MACLEAN'S have stirred up more comment than anything else appearing in the press of the country. He knows politics from the inside. "Why Laurier Will Wait" is a forecast of the near future that bristles with interesting points. A few of the other "head-liners" in this issue:

Bolsheviks at Work in Canada

A senstaional article on activities in subterranean circles. There are foreigners in Canada ready to wave the red flag.

Achievements of the Canadian Army

Since the Canadian Division was formed, they have not retired a foot nor lost a gun—a marvellous record. An inside story of how this great army was handled and controlled is told by H. F. Gadsby who spent a month at Headquarters during the last great offensive.

The Grave Dangers of Peace

An article by Agnes C. Laut on the insidious new propaganda being launched by the Germans to split the Allies.

Jock in a Juggernaut

The most interesting war article in a long while, because it is new—it deals with experiences in the tanks.

AND THESE AS WELL:

The Dance Halls of Dawson - By E. Ward Smith

My Hour - - - By Robert W. Service

The Strange Adventure of a Rialto Rainstorm - By Arthur Stringer

Old Times in Canada - - By Walt Mason

The Minx Goes to the Front - - - - By C. N. and A. M. Williamson

The Three Sapphires - - By W. A. Fraser

Mr. Craighouse, of New York, Satirist - - By Arthur Beverley Baxter

The Intercepting Spark, By Mary Josephine Benson

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Don't miss this unusual opportunity. Simply sign the coupon, pin a postal note to it, and mail it to us.

TO-DAY

Tear off here and mail

The MacLean Publishing Company,
143 University Ave.,
Toronto, Ontario.

I accept your offer. I am enclosing $1.00 to pay for MACLEAN'S MAGAZINE for six full months. Please start me off with the big January issue.

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High Speed STEEL HOISTS

The Right Solution for Your Lifting Problem

Wright Hoists will outlift and outlast any other block on the market.

Every load sustaining part is practically indestructible.

Constructed of steel and cast iron throughout.

Wright hoists raise loads quickly, easily and economically—they are the Hoists that NEVER FOUL, the hoists that will save money for your plant.

Write for Catalog.

WRIGHT MFG. CO., LISBON, OHIO

LANDIS DIE HEAD PRODUCES 30-$\frac{1}{4}$" BOLTS PER MINUTE

Threading 30 ¼" bolts per minute is the job of a Landis Die Head in a big plant. This production is not obtained spasmodically, but the head day by day has been maintaining this same steady pace.

The chasers used on this job have been ground but once in two weeks. Do you get the full meaning of this? The Landis Chaser has at least three inches of available cutting material and only 1/32 inch is removed at each grinding. Consider then the life of one set of chasers and the corresponding low cost of upkeep.

This same company have six heads in all installed, and every one is producing results which have one meaning—the superiority of the Landis Die.

Do you obtain such results? Send us your specifications and let us prove to your satisfaction that the Landis Chaser will insure better threads, a higher production, and an extremely low threading cost.

Catalogue No. 24 on request.

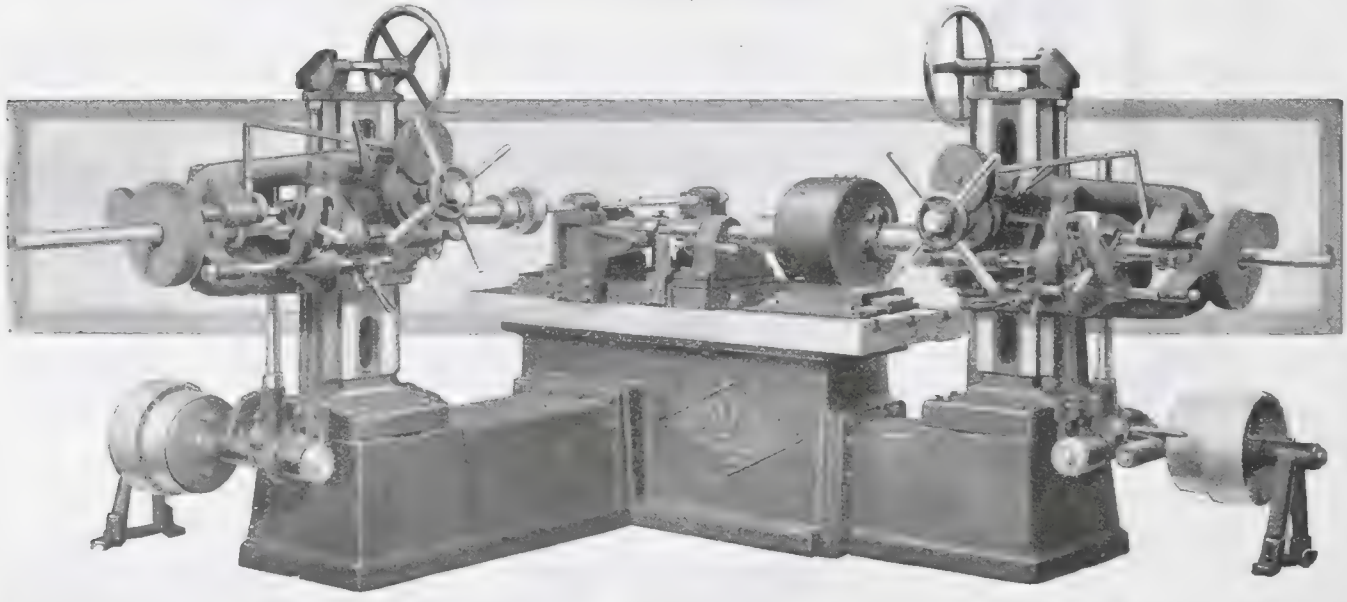
LANDIS MACHINE COMPANY
WAYNESBORO, PA.

Rockford Horizontal Boring Machine

For Automobile Manufacture

This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.

"We don't need to buy those additional Cleaning Tanks"

"OAKITE has increased the capacity of our old ones so that they now keep ahead of production.

"We were up against it for a long time in the cleaning room. Production was increasing all the time, and those old tanks simply couldn't stand the gait.

"But Oakite saved the day!

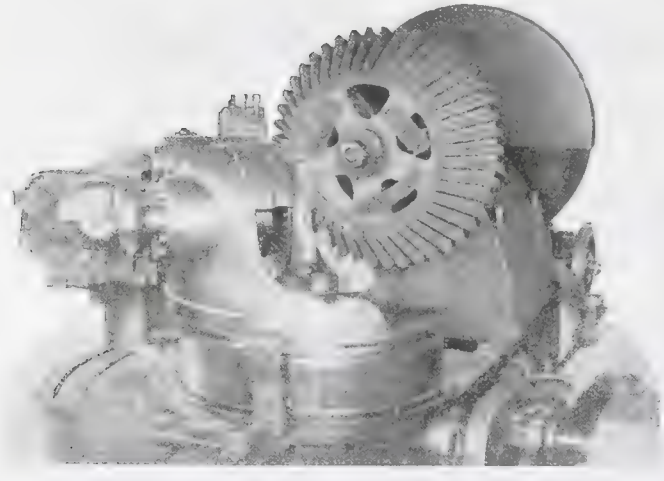
"It cleans so much faster than our old method that our same old tanks are now turning out the work easily."

Always get the advice of the Oakite man on any "cleaning" question

OAKITE MANUFACTURED BY OAKLEY CHEMICAL CO. 34 THAMES STREET · NEW YORK

There Is Always One Best Way

And with our large and varied equipment we can place YOUR JOB on the BEST machine for its particular requirements.



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Every Description

Over Twenty Years of Foundry Experience at your Service

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How is it done? Are you getting the necessary speed? Is the quality of the highest character? How much is it costing you?

The Grant Rivet Machine has established the records of one clean, perfectly finished rivet per second. Is that speedy enough, or is it too speedy? This is the fastest any similar machine will work and if too speedy it could be worked in conjunction with some other work. Our catalogue is worth writing for. There is one for you.

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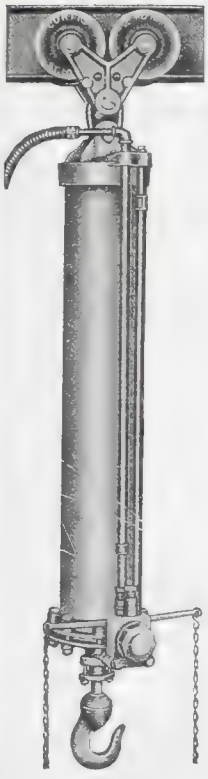

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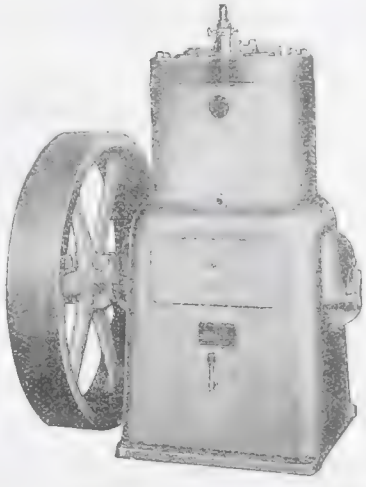
AIR COMPRESSORS—AIR HOISTS—BRIDGE, JIB AND TRAVELING CRANES—SINGLE I-BEAM TROLLEYS.

We have specialized for over 22 years on pneumatic machinery. We have developed the simple air cylinder into a straight line motor with wonderful speed control and dependability capable of the widest application to hoisting problems.

Our new controlled-splash oiling system with regulatable sight feed cylinder oiling is something entirely new in air compressor design.

Complete catalogs and descriptive circulars on our entire line furnished on request.

Orders for Curtis products for Government work and essential industries given preference treatment.



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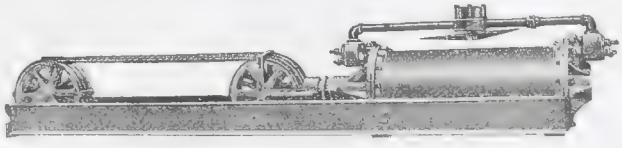

CANADIAN MADE CANADIAN MADE

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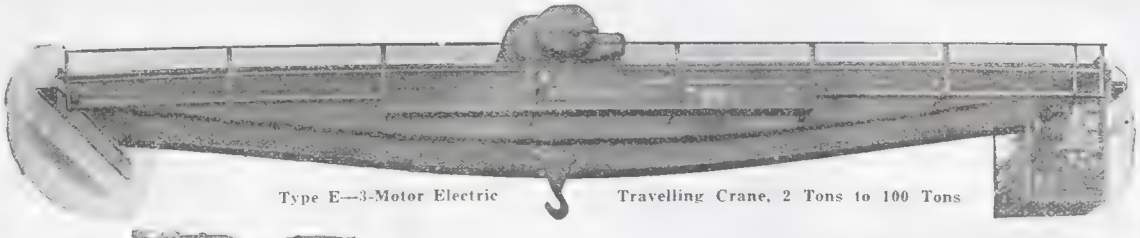
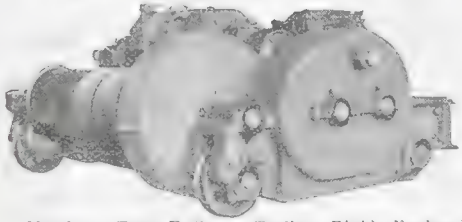
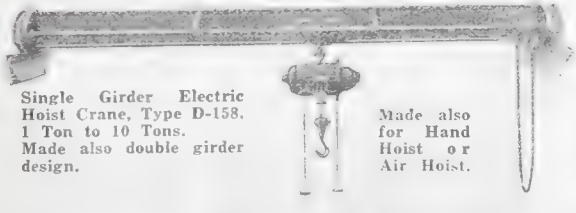


Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.

Type D Electric Hoists —½ to 10 Tons.

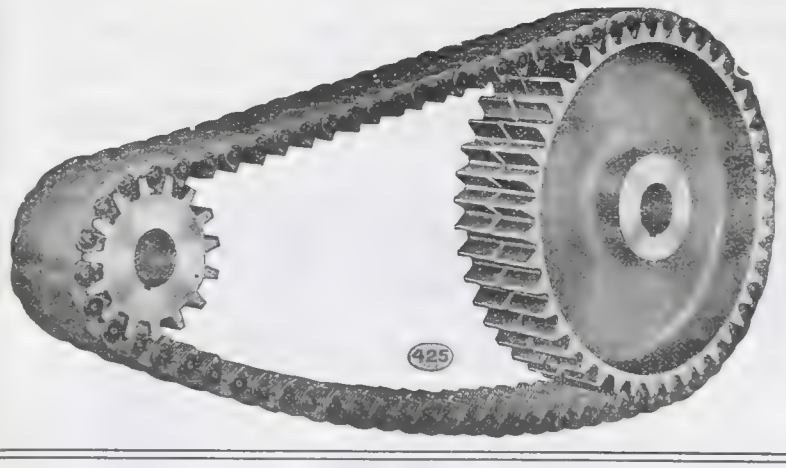
Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada

Your copy of book 66 is ready to be mailed. It contains much useful information about chain-hoists, trolleys, jib-cranes and overhead cranes—hand or electrically-operated. Write a line to The Herbert Morris Crane & Hoist Company Limited, Niagara Falls, Canada.



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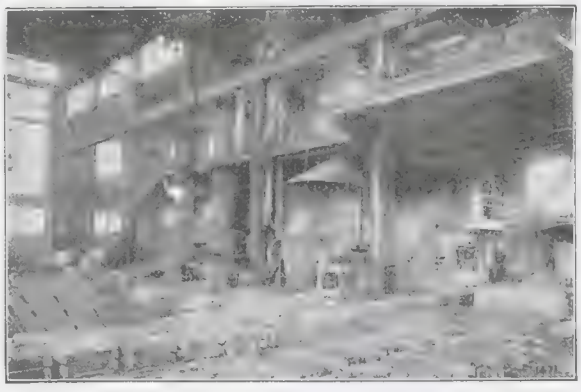

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Designed, equipped and started in operation.

Cranes of all Types

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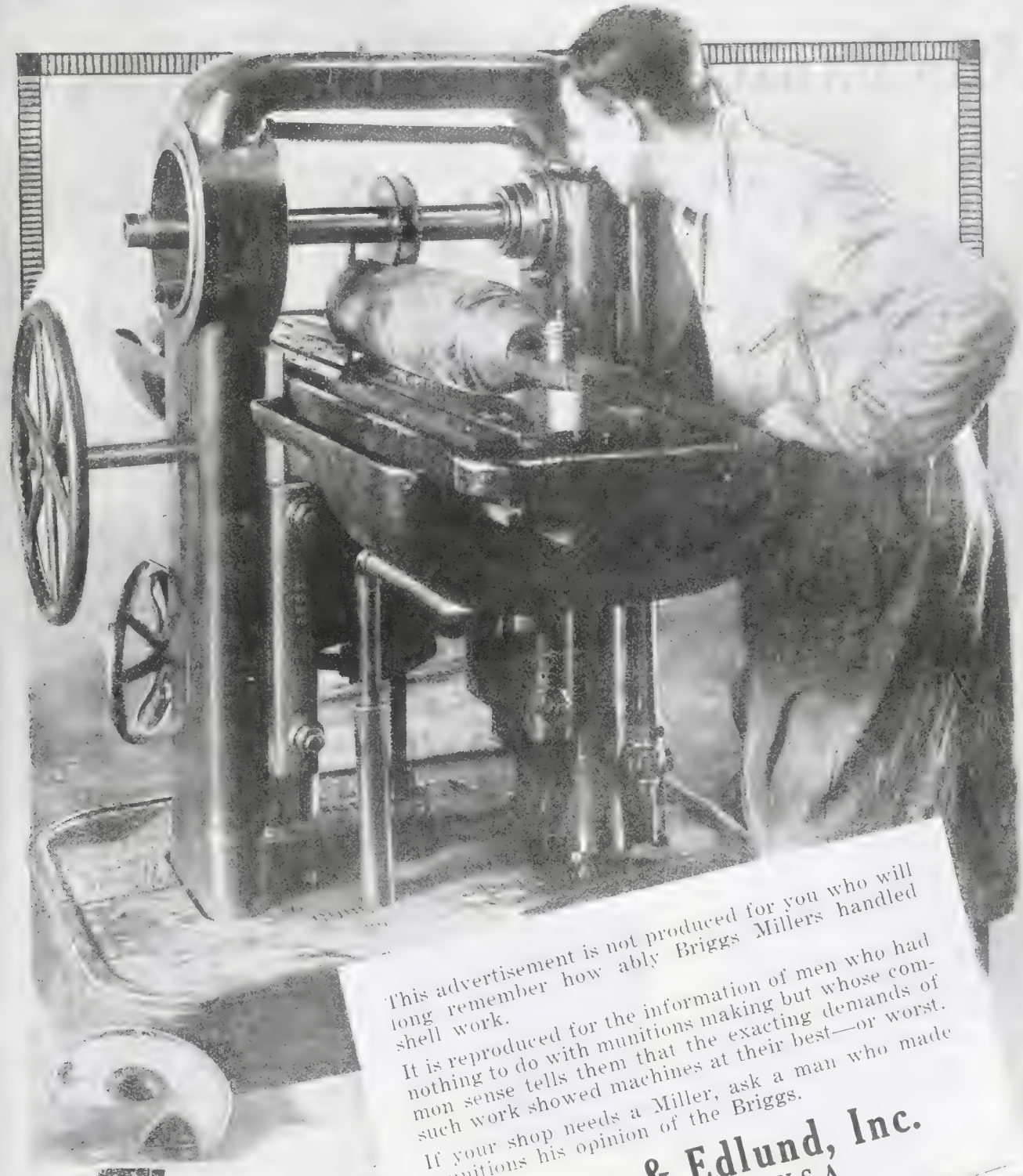

The Briggs Miller

This advertisement is not produced for you who will long remember how ably Briggs Millers handled shell work.

It is reproduced for the information of men who had nothing to do with munitions making but whose common sense tells them that the exacting demands of such work showed machines at their best—or worst.

If your shop needs a Miller, ask a man who made munitions his opinion of the Briggs.

Gooley & Edlund, Inc.
Cortland, N.Y., U.S.A.

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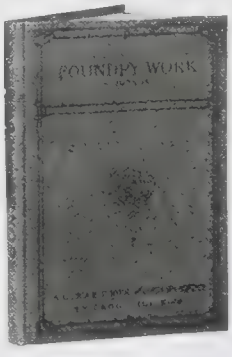
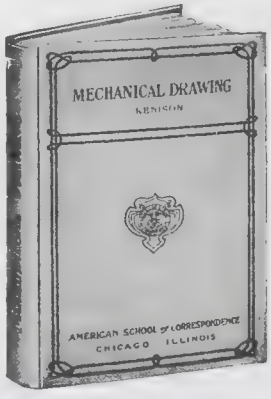
Mechanical Engineering Books

If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.

MACHINE-SHOP WORK. By **Frederick W. Turner,** Instructor in Machine-Shop Work, Mechanics Arts High School, Boston. 208 pp., 241 illus. Cloth binding. The use of various hand tools is explained, followed by a comprehensive discussion of the lathe and lathe tools, with the methods of screw cutting, taper and eccentric turning, etc. The way to figure compound gears for screw cutting; drilling; boring; planers; shapers; slotters; milling machines and cutters; how to cut spirals, gears, cams, etc.; grinding; the operation of automatic machines. Price **$1.50**



FOUNDRY WORK. Revised by Burton L. Gray, instructor in Foundry Practice, Worcester Polytechnic Institute. 224 pp., 191 illus. Cloth binding. A practical handbook on standard foundry practice, including hand and machine molding, cast iron, malleable iron, steel and brass casting, foundry management, etc. Includes use of various types of molding machines. Price, **$1.00**

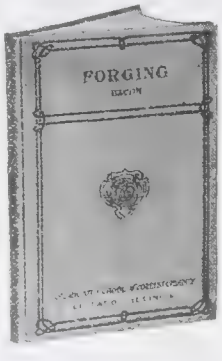


MECHANICAL DRAWING. By **Ervin Kenison, S.B.,** Assistant Professor of Mechanical Drawing, Massachusetts Institute of Technology. 176 pp., 120 illus. Cloth binding. Gives a course of practical instruction in the art of Mechanical Drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates. Price **$1.00**

PATTERN MAKING. By **James Ritchey,** Instructor in Wood Working, Armour Institute of Technology. 160 pp., 250 illus. Cloth binding. Shows the reader how to take the blueprint and from it make the pattern for any kind of casting under any condition. The allowances for shrinkage, draft, and finish are explained. Simple and built-up patterns of all kinds are clearly treated. Various special cases are taken up, such as pulleys, cranks, pipe connections, valves, etc. Price.....**$1.50**

MACHINE DESIGN. By **Charles L. Griffin, S.B.,** Assistant Engineer, the Solvay-Process Co., American Society of Mechanical Engineers. 208 pp., 82 designs. Cloth binding. Explains in detail how to make the entire design of all kinds of machinery, how to lay out gears, etc., with complete specimen designs of numerous machines. Price ...**$1.50**

FORGING. By **John Lord Bacon,** Eng. and Supt. of Construction, with R. P. Shields & Son, San Diego, Cal., American Society Mechanical Engineers. Author of "Forge Practice." 128 pp., 180 illus. Cloth binding. A working handbook of practical instruction in hammering, working, forming, and tempering of wrought iron, machine steel, and tool steel, including the important modern development of electric welding. Price **$1.00**



TOOL MAKING. By **Edward R. Markham,** Consulting Mechanical Engineer, formerly Superintendent of the Waltham Watch Tool Co., American Society of Mechanical Engineers. Author of "The American Steel Worker." 224 pp., 325 illus. Cloth binding. Takes up the methods of treating tool steels—annealing, tempering, spring tempering, hardening, case-hardening, etc.; how to make drills and reamers of all kinds; the making of arbors and mandrels, taps, hobs, reamer and tapholders, jigs, gauges, dies and die-holders of all kinds, counterbores, facing tools, milling cutters, hollow mills, and forming tools. Gives all necessary information for tool making in all its branches. Price **$1.50**

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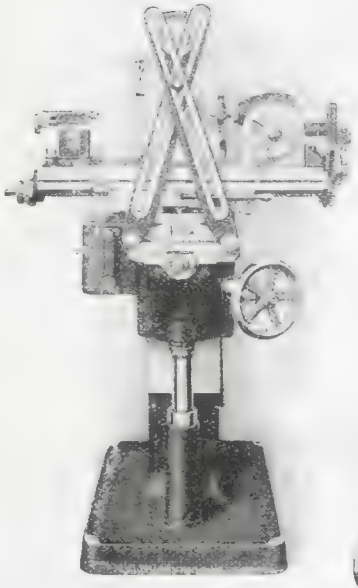
REGISTERED

MILLING MACHINES

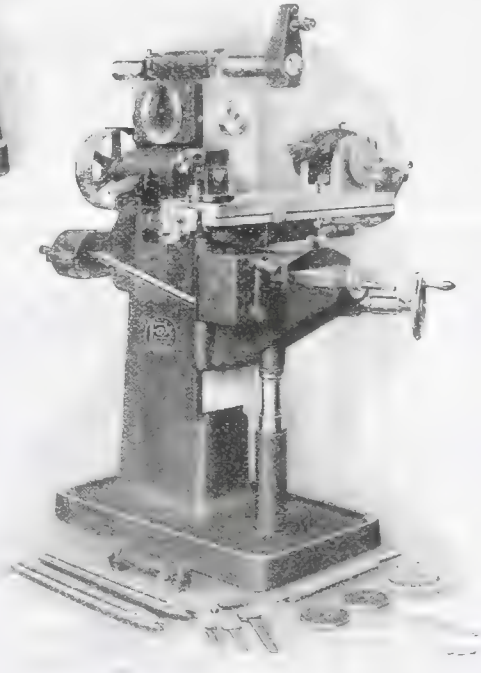
FOR

Rapid Production of Motor Parts



The **demand** for increased production **requires tools** of **great strength** and **durability**; the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**



The **United States Government** is using this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for the prosecution of the war.

Specifications– No. 2-A Miller.

Spindle speeds ....12 From 21 to 423 r.p.m.

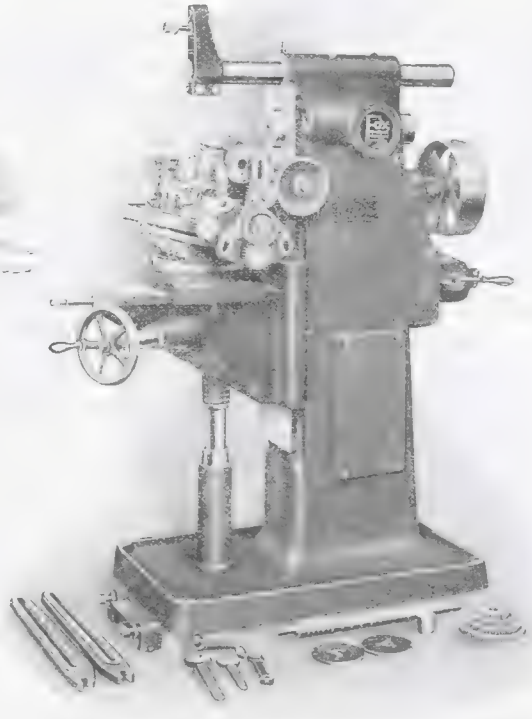
Table feeds ..... 6 From .317″ to 2.79″ per min.

Table .....8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

Drive...Single pulley 10 x 3″ running 250 r.p.m.

Gears Hardened steel.

Weight .....1,500 lbs.



We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This is **proven** by **the hundreds** of **them in** the **largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.

FOX MACHINE COMPANY

1047 W. Ganson St., Jackson, Michigan, U.S.A.

A Time Saver—
Can You Beat It?

HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, which properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

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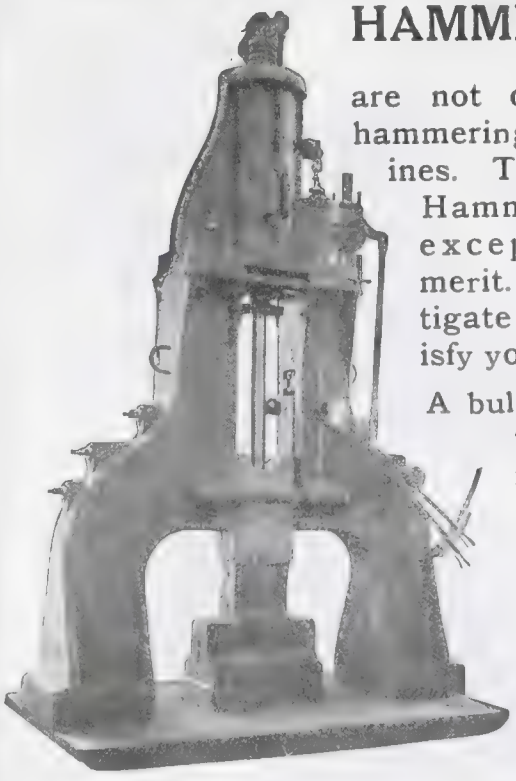
HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

"ERIE" STEAM FORGING HAMMERS



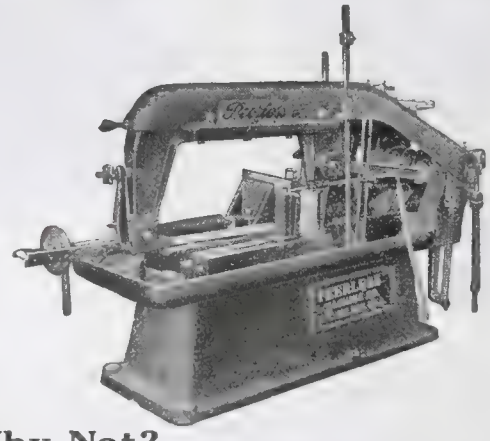
are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U. S. A.

Peerless HIGH SPEED

THE NEW STANDARD
Increases Production 50 to 100%



Why Not?

WHEN big plants of national reputation, who are using three, six, eight, twelve and up to thirty or more Peerless Machines say that they increase production from 50 to 100 per cent., saving in time, labor, blades and expensive material;

AND WHEN we are willing to have you try out the Peerless for 30 days' at our own risk and expense, we paying freight both ways if it fails to make good;

THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

PEERLESS MACHINE CO.
1607 RACINE STREET RACINE, WISCONSIN

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They are now equipped to handle everything in Oxy-Acetylene, Electrical and Thermit work. No job too small, and none too large.

OXY-ACETYLENE WELDING
DAVIS
APPARATUS
DAVIS-BOURNONVILLE CO. N.Y.

THE CARTER WELDING COMPANY OF TORONTO, LIMITED, are the sole Canadian agents for the DAVIS-BOURNONVILLE Welding and Cutting Apparatus, and handle—

Portable Generators
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Carbon Removers
Portable Trucks
Compressed Acetylene
Electrolytic Oxygen
99.80% pure

There is no connection with any other firm in Canada under a similar name.
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WITH THE
Etchograph

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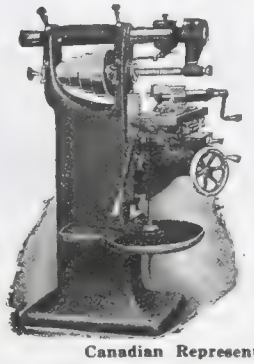
Increased Production Means Increased Profits

Large Millers
for large work
—STEPTOE
MILLERS
for small work



Large Planers
for large work
—STEPTOE
SHAPERS
for small work.

Will result in increased production; less money invested in machinery, and increased profits.

THE JOHN STEPTOE COMPANY
CUMMINSVILLE, CINCINNATI, OHIO, U.S.A

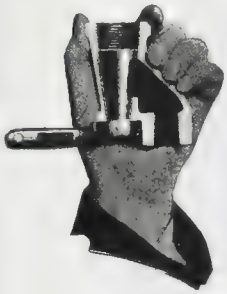
Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.

CLECO AIR HOSE FITTINGS

Valves, Couplings, Clamps, Nipples, Menders, Hose

Everything required from "Pipe Line" to "Air" Tool

All Fittings Furnished are Interchangeable and Air Tight

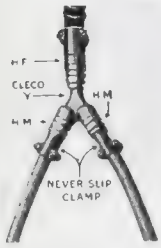


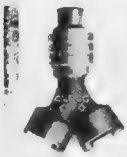
CLECO AIR-SEATED VALVES

The CLECO Air Valve has but three parts: Body, Valve Plug and Handle; no Packing required, has Waste arrangement.

The CLECO Valve, style P.O., is made in sizes ½-inch to 1½-inches, with standard pipe thread. Style F.O. is made in one size only; 1-inch pipe thread inlet, and ¾-inch Female Bowes Coupling Outlet and is interchangeable with Male Ends from ¼-inch to ¾-inch.

CLECO "Y" HOSE FITTINGS





The Hose Section illustrated shows "Y" Fitting connected. The "Y" permits use of two Leader Hose Lines and Two Air Tools. Designed for Ship Yards use. Are made in four styles with Male or Female Outlets or Inlets and interchange with Bowes Male or Female coupling ends; sizes ¼-inch to ¾-inch inclusive. The two "Y" fittings illustrated are the plain style. The other two styles are each equipped with a valve having same features as Cleco Air Valves described above.

Y-Fittings may also be used in Boiler and Locomotive Shops.

BOWES AIR HOSE COUPLINGS

Over 2,500,000 in general use.

The Bowes is instantly connected or disconnected by ¼-turn.

The Bowes is absolutely Air Tight under all pressures

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A. R. WILLIAMS MACHINERY CO., TORONTO — *Agents* — WILLIAMS & WILSON, MONTREAL

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The Highest Achievement
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Thor Universal Electric Drills, licensed under Burke's Universal Motor Patent, will enable your men to do more work and to do it well. These drills are most durable because practically fool-proof and because built with ample strength in every part to stand hardest service.

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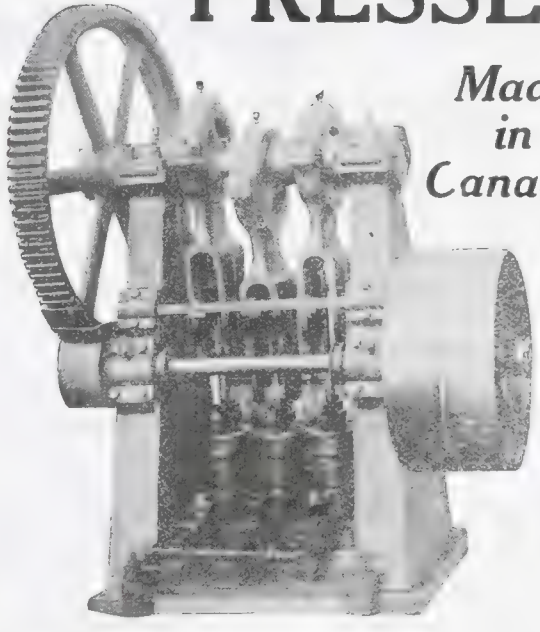

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The Dodge features—only in our lathes—minimize floor space—cut out long and superfluous belting—reduce shafting, hangers and pulleys—stimulate the operator—increase production—reduce manufacturing costs.

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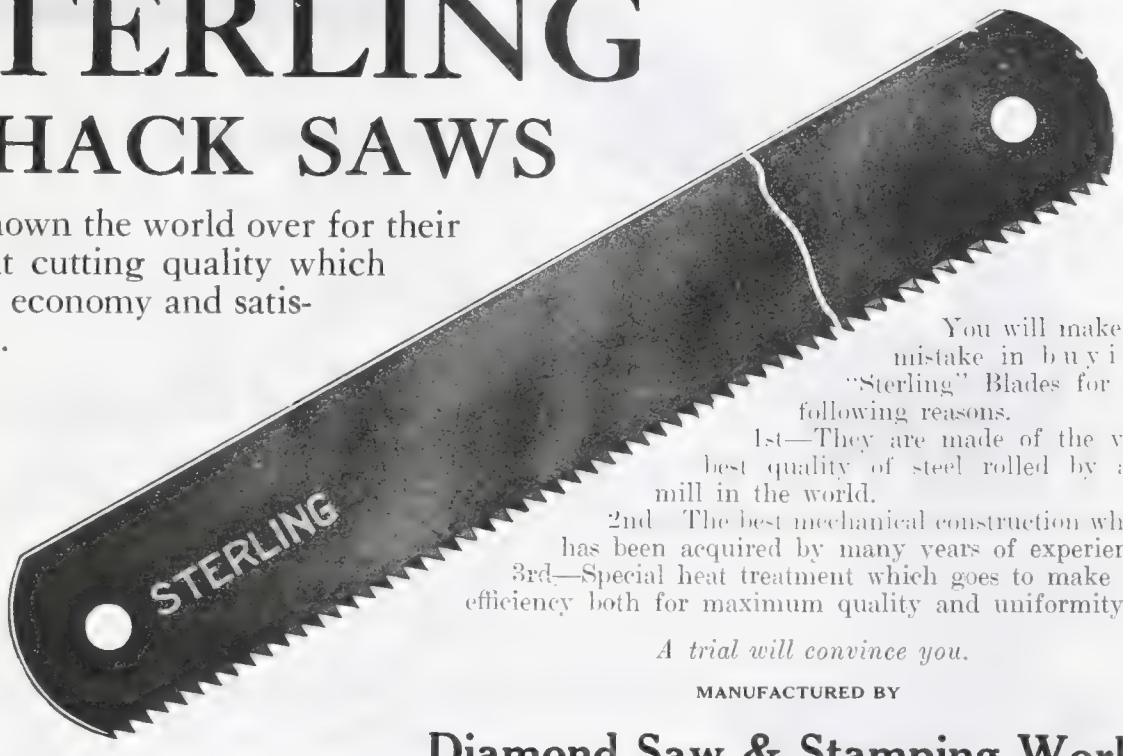

You will make no mistake in buying "Sterling" Blades for the following reasons.

1st—They are made of the very best quality of steel rolled by any mill in the world.

2nd—The best mechanical construction which has been acquired by many years of experience.

3rd—Special heat treatment which goes to make the efficiency both for maximum quality and uniformity.

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For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

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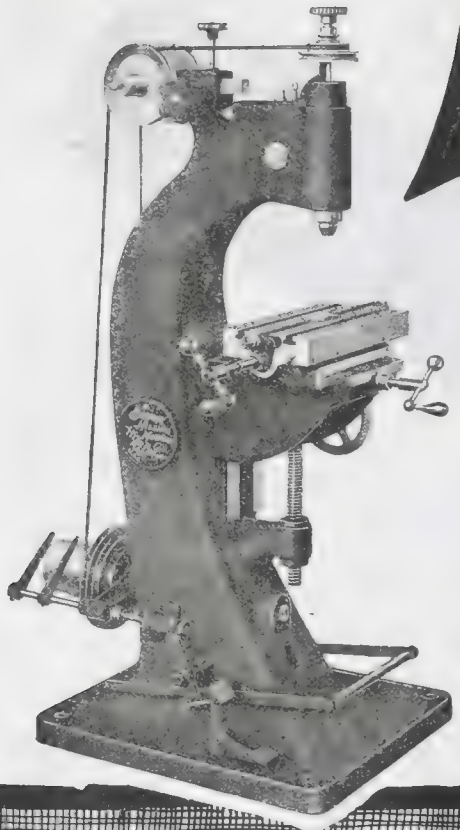

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We have the Miller that is exactly suited to your class of work. Adopt it and you will be assured of the most economical operation, combined with accuracy and high production.

Becker Milling Machines

are made in fourteen types and twenty-four sizes. We can make quick deliveries on the following smaller sizes:
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Because it grinds efficiently every shape any other grinder will and also does much work no other grinder can handle. Spindles are genuine crucible steel—ground and running in ring oiled bronze bearings.

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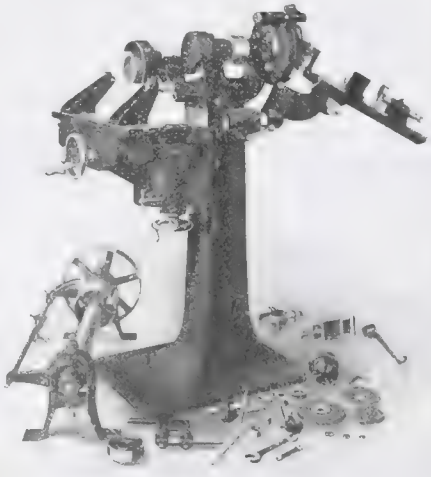

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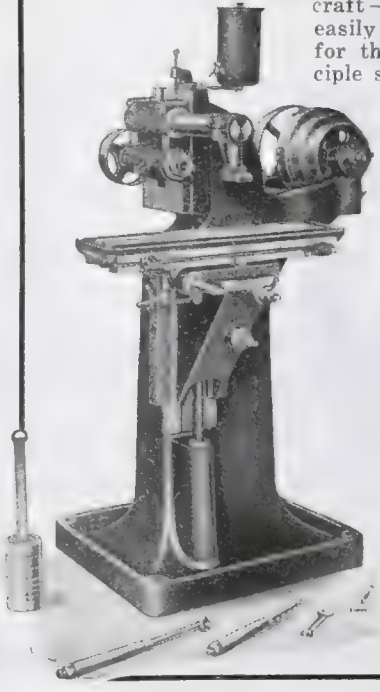
Battleships steamed for the harbor when enemy submarines were about. That's where they belonged. The work of fighting the deep sea pests was left to smaller craft — they were quicker, more easily handled and more capable for the work. The same principle should apply in your shop practice.



U.S. MILLER

should be used for milling small parts. They too are quicker, more easily handled and more capable for this work than big tools. You can actually reduce your milling costs one-third to one-half on each part by the use of the U. S. Hand and Weight Miller. Finely built to combine speed, accuracy and durability.

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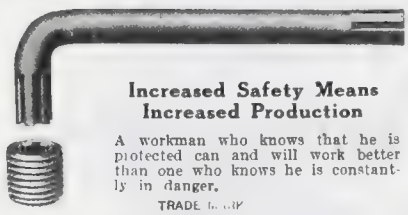

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A workman who knows that he is protected can and will work better than one who knows he is constantly in danger.

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Protect the workman. Free from the need of watching projecting screws which might catch his clothing, he has more time to devote to his work. You yourself will be freed from worry over the safety of your men. And you will be free from law suits, too.
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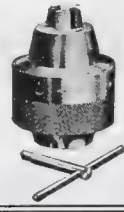

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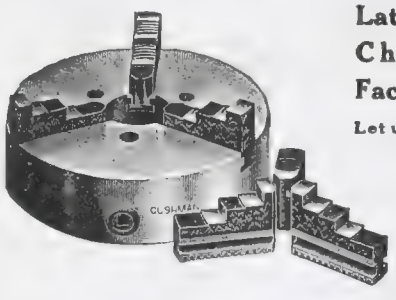

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Let us send you our catalog.

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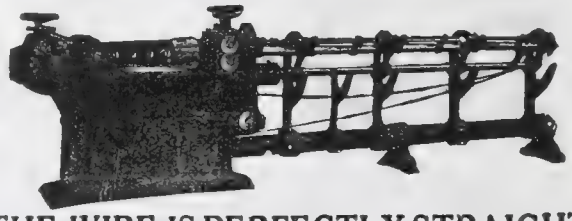

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and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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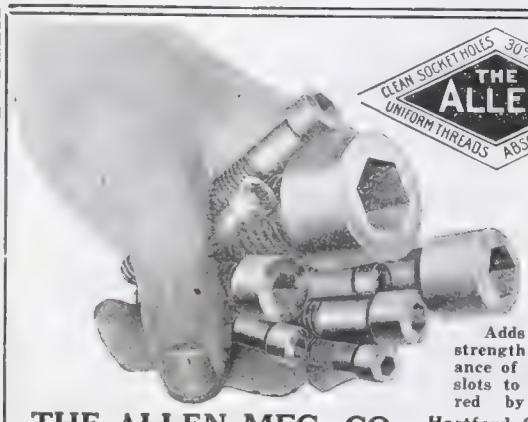

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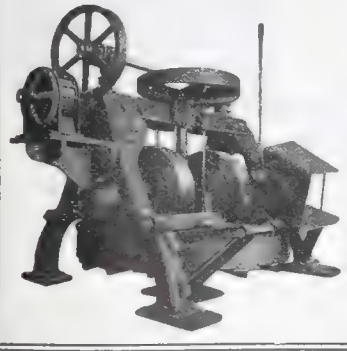

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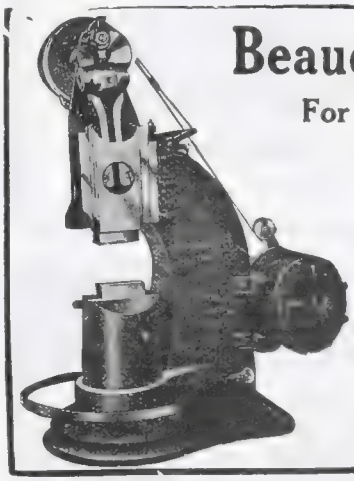

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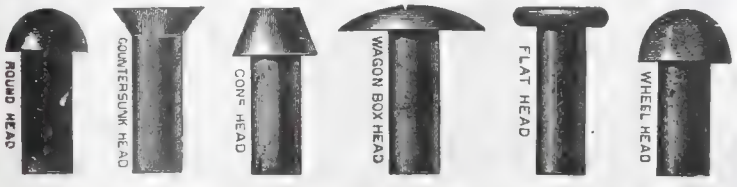

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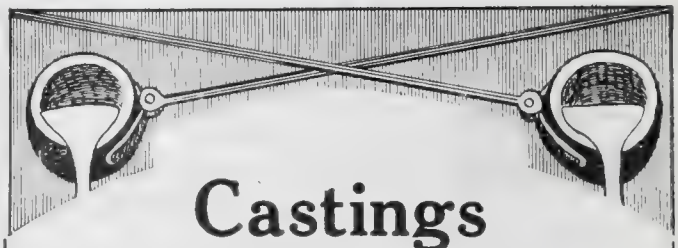

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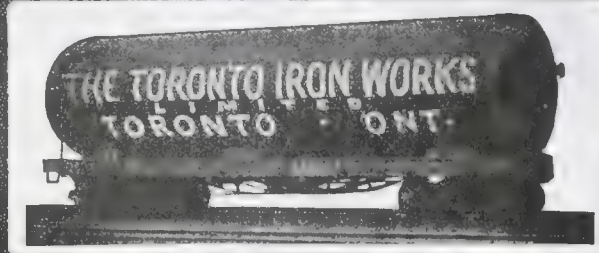

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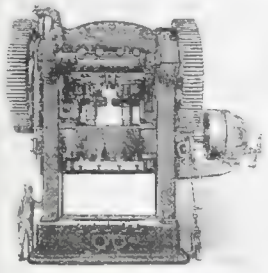

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Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 year's experience.

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FOR LOW AND MODERATE PRESSURES

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"The Air-Tight Blast Gates in use in our plant have given entire satisfaction."
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Our NEW AIR-TIGHT BLAST GATE will save the air (**money**) you are now losing through leaky blast gates.

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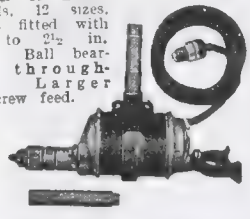

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and Compound Table

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For any Drill Press 14" to 42" swing. Big Economy — Big Convenience — Small Price. It relieves your large millers, comes in handy spotting castings, milling ends of bosses, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices. Write for circulars to-day.

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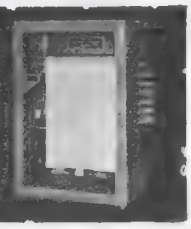

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Mr. Manufacturer, if you were using Hoyt's Frost King Babbitt in your machinery bearings you wouldn't worry about the damage the cold might accomplish. Frost King can stand more chilly weather than an Eskimo and it'll keep your factory wheels turning steadily and smoothly in the frostiest weather known.

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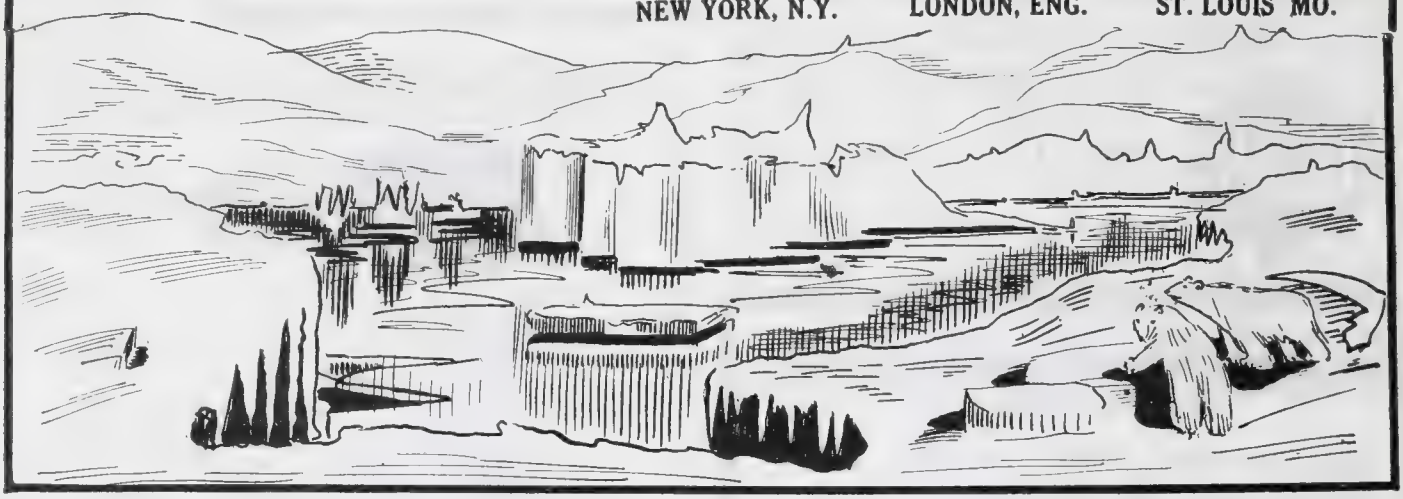
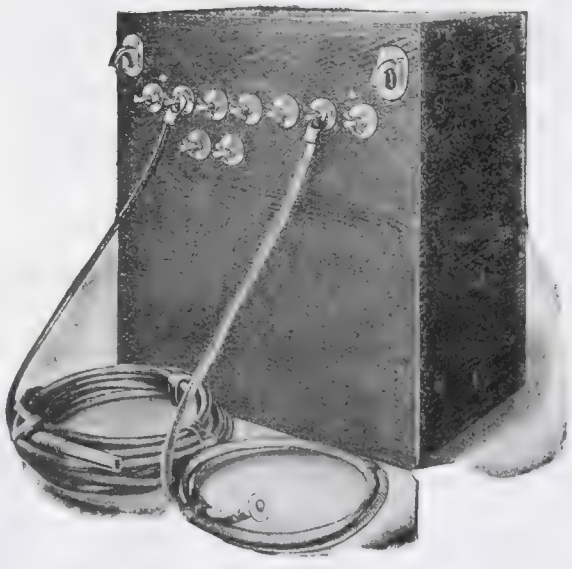


Alternating Current Arc-Welding



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Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

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Canada Emery Wheels Co., Hamilton, Ont.
Dom. Abrasive Wheel Co., Mimico, Ont.
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Norton Co., Worcester, Mass.
Plewes Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Rice, Lewis & Son, Toronto, Ont.

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Canadian Welding Works, Montreal, Que.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

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Welding & Supplies, Ltd., Montreal, Que.

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AIR WASHERS
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Sheldons, Ltd., Galt, Ont.

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United Brass & Lead, Ltd., Toronto.
Tallman Brass & Metal Co., Hamilton.

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Boker & Co., Inc., H., Montreal Que.
Kayser, Ellison & Co., Ltd., Montreal.
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Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Standard Alloys Company Pittsburgh, Pa.
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Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Pratt & Whitney Co., Dundas, Ont.

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Sheldons Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Pangborn Corporation, Hagerstown, Md.

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National Acme Co., Cleveland, O., and Windsor.
Riverside Machinery Depot, Detroit, Mich.
Pratt & Whitney Co., Dundas, Ont.
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Canada Metal Co., Toronto.
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Tolland Mfg. Co., Montreal, Que.
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Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
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Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.

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Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto

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Boker & Co., Inc., Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

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Pangborn Corporation, Hagerstown, Md.

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Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Katie Foundry Co., Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Victoria Foundry Co., Ottawa, Ont.

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Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie, Ont.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Foss Mchy & Supply Co., The Geo. F., Montreal.
Graton & Knight Mfg. Co., Worcester, Mass.
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Federal Engineering Co., Toronto, Ont.

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Graton & Knight Mfg. Co., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
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Rice, Lewis & Son, Toronto, Ont.
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Gutta Percha & Rubber, Ltd., Toronto, Can.
Sadler & Haworth, Montreal.

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Dominion Belting Co., Hamilton, Ont.
Gutta Percha & Rubber, Ltd., Toronto, Can.

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New Britain Mach. Co., New Britain, Conn.

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Wickes Bros., Saginaw, Mich.

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Bertrams, Limited, Edinburgh, Scotland.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Garlock-Walker Machinery Co., Toronto, Ont.

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Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
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Niles-Bement-Pond Co., New York.
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MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que
Marsh Engineering Works, Belleville, Ont.
Riverside Machinery Depot, Detroit, Mich.
Waterous Engine Works, Brantford, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
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Landis Machine Co., Waynesboro, Pa.
Rice, Lewis & Son, Toronto, Ont
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
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Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Rice, Lewis & Son, Toronto, Ont.
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Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Riverside Machinery Depot, Detroit, Mich.
Williams Machinery Co., A. R., Toronto.

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Victor Tool Co., Waynesboro, Pa.

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Gisholt Machine Co., Madison, Wis.
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Universal Boring Mach. Co., Hudson, Mass

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Canada Machinery Corp., Galt, Ont
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Foss Mchy. & Supply Co., The Geo. F., Montreal.
Niles-Bement-Pond Co., New York.
Yates Machine Co., P. B., Hamilton, Ont.

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Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont
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BRONZE, COPPER
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Garlock-Walker Machinery Co., Toronto, Ont.
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Oberdorfer Brass Co., M. L., Syracuse, N.Y

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Wilson & Co., J. C., Belleville, Ont

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Marsh Engineering Works, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CARS, STEEL BODY
Marsh Engineering Works, Belleville, Ont.

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Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Katie Foundry Co., Galt, Ont.
Tolland Mfg. Co., Montreal, Que.
Winnipeg Iron Foundry Co., Winnipeg.
Wilson & Co., J. C., Belleville, Ont.

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Algoma Steel Corp., Sault Ste. Marie, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Magnet Metal & Foundry Co., Winnipeg, Man.
Oberdorfer Brass Co., M. L., Syracuse, N.Y
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

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Goldie & McCulloch Co., Galt, Ont.
Tolland Mfg. Co., Montreal, Que.

CASTINGS, BUILDERS'
Katie Foundry Co., Galt, Ont.

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Bernard Industrial Co., The A., Fortierville, Que.
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Can. Rumely Co. Toronto, Ont.
Can. Steel Foundries Ltd., Montreal, Que.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Magnet Metal & Foundry Co., Winnipeg, Man.
Marsh Engineering Works, Belleville, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Tolland Mfg. Co., Montreal, Que.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Katie Foundry Co., Galt, Ont.
Wilson & Co., J. C., Belleville, Ont.
Welland Mach. & Foundries, Ltd., Welland, Ont

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CASTINGS, ROUGH
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CASTINGS, PLUMBERS'
Katie Foundry Co., Galt, Ont.

CASTINGS, NICHROME
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CASTINGS, JOBBERS'
Katie Foundry Co., Galt, Ont.

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Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Kennedy & Sons, Ltd., Owen Sound.

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Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont

CASTINGS, NICKEL STEEL
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Gardner, Robt., & Son Montreal

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CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont

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Hurlburt, Rogers Mach. Co., South Sudbury, Mass
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros Co. of Canada, Galt, Ont.

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Morris Crane & Hoist Co., Herbert Niagara Falls, Ont

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Ford Chain Block & Mfg Co Philadelphia, Pa
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont
Reading Chain Block Mfg. Co., Reading, Pa
Rice Lewis & Son Toronto, Ont.
Weight Mfg. Co. Lisbon, Ohio

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co. Toronto, Ont.
Morse Chain Co. Ithaca, N.Y.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co. Toronto, Ont.
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Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co. Coventry, England
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

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Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont

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Can. Inspection & Testing Lab., Montreal, Que
Toronto Testing Laboratory, Ltd., Toronto

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Eagle Mfg. Co., Hamilton, Ont
Mechanics Tool Chest Co., Toronto

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J. F. A. Comstedt, New York City, N.Y
General Steel Co., Milwaukee, Wis.

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y
General Steel Co., Milwaukee, Wis.

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Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Manufacturers Equipment Co., Chicago, Ill
Smalley-General Co., Inc., Bay City, Mich.

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Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Manufacturers Equipment Co., Chicago, Ill
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
D. & W. Fuse Co., Providence, R.I
F. Pratt & Co., Halifax.
Heald Machine Co., Worcester, Mass.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont
F. Pratt & Co., Halifax.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
F. Pratt & Co., Halifax.
Thomas Elevator Co., Chicago, Ill.

CHUCKS, SPLIT
Rivett Lathe & Grinder Co., Boston, Mass.

CHUCKS, DRILLS AND TAPS
Bicknell-Thomas Co., Greenfield, Mass

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A

CLAMPS
Preston Woodworking Machine Co., Preston, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLEANERS, BOILER TUBE
Goldie & McCulloch Co., Galt, Ont.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES
Goldie & McCulloch Co., Galt, Ont.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass.
Manufacturers' Equipment Co., Chicago, Ill
Rivett Lathe & Grinder Co., Boston, Mass.
Wilson & Co., J. C., Belleville, Ont

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd Faiquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich.
Smart-Turner Machine Co., Hamilton, Ont.

CONCRETE MACHINERY
St Clair Bros., Galt, Ont.

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found's & Forgings, Ltd., Welland, Ont

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Homer & Wilson, Hamilton, Ont.
Katie Foundry Co., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS AND STARTERS
Williams Machy. Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co, Harvey, Ill.

CONVEYING MACHINERY
Brown Portable Conveying Mach. Co., Chicago

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement Pond Co., New York.

COPPER, BUS BAR, SHEET, PLATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Almond Mfg. Co., T. R., Ashburnham, Mass.
Baird Machine Co., Bridgeport, Conn.
Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.

COUPLINGS, SHAFT
Goldie & McCulloch Co., Galt, Ont.
W. H. Nicholson & Co., Wilkesbarre, Pa.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES
Pollard Mfg. Co., Niagara Falls, Can

CRANES, JIB
Pollard Mfg. Co., Niagara Falls, Can.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que.
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANK SHAFTS
Canada Found's & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice, Lewis & Son, Toronto, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
J. C. Wilson & Co., Belleville, Ont.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUCIBLES
Hyde Engineering Co., Montreal, Que.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

CUPOLA BLOCKS
Hyde Engineering Co., Montreal, Que.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont

CUT-OFF COUPLINGS, FRICTION
Zenith Steel & Coal Products, Montreal, Que.
J. C. Wilson & Co., Belleville, Ont.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Yates Machine Co., P. B., Hamilton, Ont.

CUTTING AND WELDING PLANTS
Canadian Welding Works, Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies, Ltd., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont

CYLINDERS, AIR
Manufacturers Equipment Co., Chicago, Ill
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co, Hinckley, Ill
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
M. Beatty & Sons, Ltd., Welland, Ont.
Dominion Bridge Co. Montreal.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DERRICK IRONS AND FITTINGS
Pollard Mfg. Co., Niagara Falls, Can.

DIAMOND TOOLS
Wheel Trueing Tool Co., Windsor, Ont.
Anderson & Co. of Can., Geo., Montreal, Que.
Wheel Trueing Tool Co., Detroit.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DISCS, LATHES, ETC.
Leather Products of Canada, Hamilton, Ont.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal
Stoll Co., Inc., D. H., Buffalo, N.Y
Wells Brothers of Canada, Galt, Ont.

DIES, NOSING
Marsh Engineering Works, Belleville, Ont

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Wells Brothers Co. of Canada, Galt, Ont.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Ltd., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

DREDGES, DIPPER, HYDRAULIC AND CLAMSHELL
M. Beatty & Sons, Ltd., Welland Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach Co., Hamilton, Ont.
Wheel Trueing Tool Co., Windsor, Ont.

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford
Burke Machine Tool Co., Conneaut, O.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp, Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Riverside Machinery Depot, Detroit, Mich.
Stow Mfg. Co., Binghampton, N.Y.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.

DRILL CHUCKS, QUICK-CHANGE
The McCrosky Reamer Co., Meadville, Pa.

DRILL RODS
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLS
W. T. Whitehead, Son & Co., Montreal Que.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Henry & Wright Mfg. Co., Hartford, Conn.
A. B. Jardine & Co., Hespeler, Ont

Landis Tool Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
W. T. Whitehead, Son & Co., Montreal, Que.

DRILLING MACHINES
Universal Boring Mach. Co., Hudson, Mass.

DRILLING MACHINES RADIAL AND TURRETT
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Reed-Prentice Co., Worcester, Mass.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati, Ohio

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Reed-Prentice Co., Worcester, Mass.
Niles-Bement-Pond Co., New York.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.

DRILLING MACHINES, BALL BEARING
Cincinnati Pulley Mach. Co., Cincinnati.

DRILLING MACHINES, VERTICAL
Giddings & Lewis Mfg. Co., Fond du Lac, Wis.

DRILLING MACHINES, WALL RADIAL
Lund Fairquhar Co., Boston, Mass.
Wickes Bros., Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Millers Falls Co., Millers Falls, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que.
Atkins & Co., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall & Co., Geo., Toronto, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co of Canada, Walkerville, Ont.
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Millers Falls Co., Millers Falls, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Perfect Machine Co., Galt, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

DRIVES, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DRUM CONTROLS
Electric Steel & Metals, Ltd., Welland, Ont

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Ltd., Galt, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELECTRIC FURNACES
Electric Furnace Construction Co., Philadelphia, Pa.
Volta Mfg. Co., Welland, Ont
Electric Steel & Metals, Ltd., Welland, Ont

ELECTRIC FURNACE REGULATORS AND EQUIPMENT
Volta Mfg. Co., Welland, Ont

ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND ENGINES
Automatic Transportation Co., Buffalo, N.Y.

ELEVATOR ENCLOSURES
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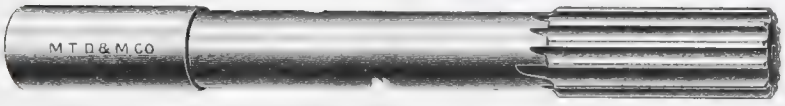

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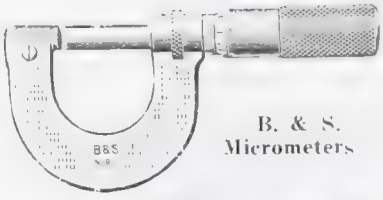

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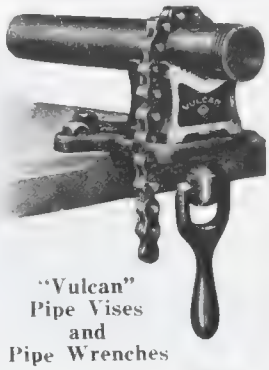

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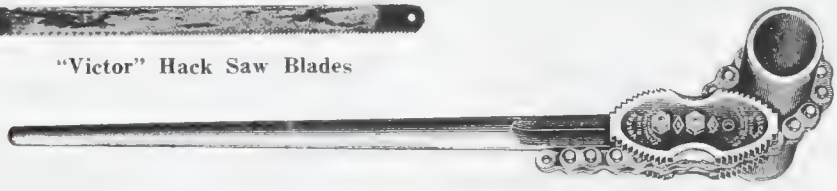

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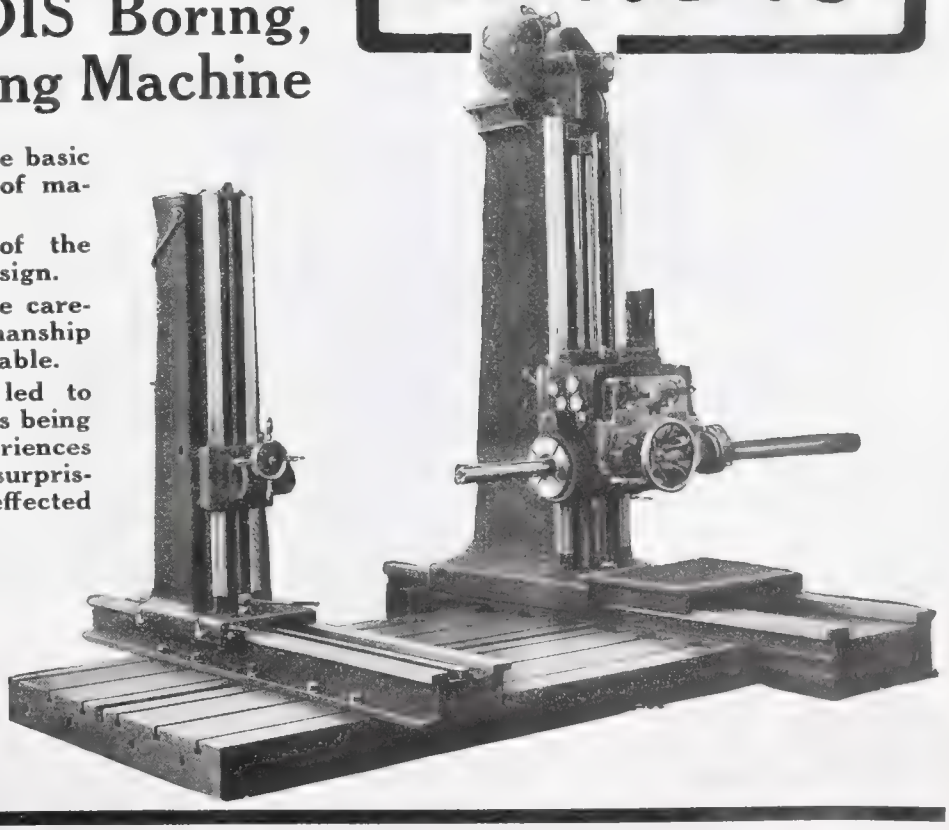

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M. Beatty & Sons, Ltd., Welland, Ont.

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Independent Pneumatic Tool Co., Chicago, Ill.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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HAMMERS, STEAM
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Illinois Tool Works, Chicago, Ill.

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MacGovern & Co., Montreal, Que.
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Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Marsh Engineering Works, Ltd., Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Wright Mfg. Co., Lisbon, Ohio.

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Volta Mfg. Co., Welland, Ont.

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Pollard Mfg. Co., Niagara Falls, Ont.
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Kennedy & Sons, Owen Sound, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa

HOLDERS, ELECTRIC
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Toronto Iron Works, Ltd., Toronto, Ont.

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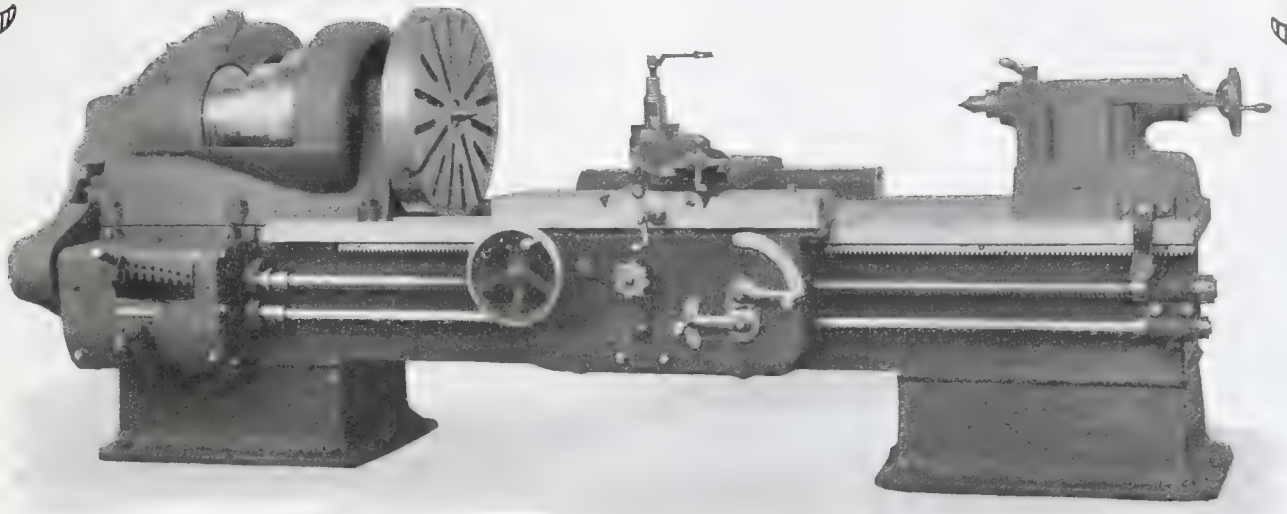

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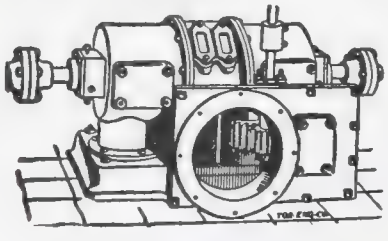

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Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss, The Geo. F., Mchy. & Supply Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock Walker Machinery Co., Toronto Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
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Pratt & Whitney Co., Dundas, Ont
Steptoe, The John Co., Cincinnati, Ohio

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Garvin Machine Co., New York.
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Garlock-Walker Machinery Co., Toronto, Ont.
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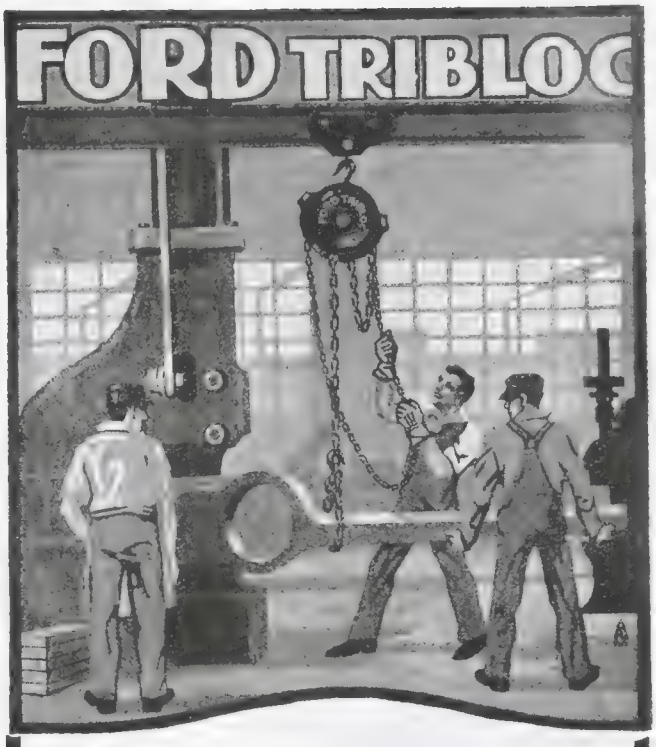

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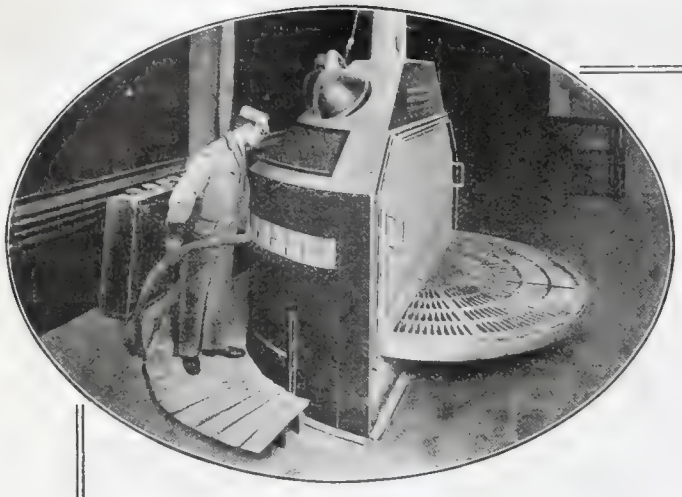

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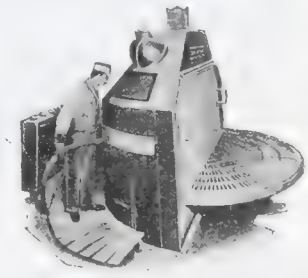

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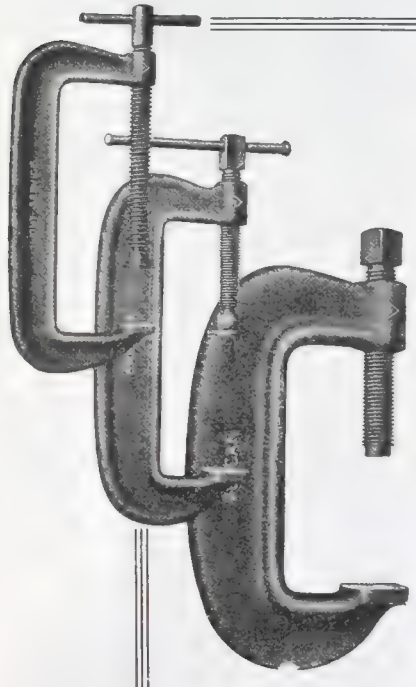

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Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont
Niles-Bement-Pond Co., New York

RAIL OVERHEAD
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, ADJUSTABLE
Can. Fairbanks Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man
Pratt & Whitney Co., Dundas, Ont

Standard Machy. & Supplies, Ltd., Montreal, Que.
The McCrosky Reamer Co., Meadville, Pa.
The Kelly Reamer Co., Cleveland, O.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
Baxter & Co., Ltd., J. R., Montreal, Que.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
The McCrosky Reamer Co., Meadville, Pa.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
McKenna Brothers, Pittsburgh, Pa.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER AND SELF-FEEDING
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, AUTOMATIC
Electric Steels & Metals, Ltd., Welland, Ont

REGULATORS, PRESSURE TEMPERATURE
Can. Fairbanks Morse Co., Montreal
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIP SAW MACHINERY
Preston Woodworking Machine Co., Preston, Ont

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Harris & Co., Arthur C., Boston, Mass.
Parmenter & Bulloch Co., Gananoque.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock Walker Machinery Co., Toronto, Ont
Independent Pneumatic Tool Co., Chicago, Ill
Niles-Bement-Pond Co., New York.

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Grant Mfg. & Machine Co., Bridgeport, Conn
High Speed Hammer Co., Rochester, N.Y
F. B. Shuster Co., New Haven, Conn

RODS
General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich

ROLLER CHAINS
Can. Link Belt Co., Toronto, Ont
Jones & Glassco, Montreal

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada
Canada Machinery Corp., Galt, Ont
Garlock-Walker Machinery Co., Toronto, Ont
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo, O.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland, Ont

ROLLS, CRUSHING
Can. Link Belt Co., Toronto

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto, Ont

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland

RUBBER GOODS
Dominion Tire & Rubber Co., Toronto

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Brown & Sharpe Mfg. Co., Providence
Lowe, Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.
L. S. Starrett Co., Athol, Mass.

SAND BLAST GLOVES
Hickory Steel Grip Glove Co., Chicago, Ill

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto, Ont

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
Willson Co., Inc., T. A., Reading, Pa.

SAND BLAST ABRASIVES
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Cowan & Co., of Galt, Ltd., Galt, Ont.

SAND BLASTING MACHINES
Richards Sand Blasting Machine Co., Montreal

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Preston Woodworking Machine Co., Preston, Ont.
Cowan & Co., of Galt, Ltd., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
A. R. Williams Machy. Co., Toronto.

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Fittings, Ltd., Oshawa, Ont.

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Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

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E. C. Atkins & Co., Indianapolis, Ind.
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, SLITTING
E. C. Atkins & Co., Indianapolis, Ind.
Taylor, J. A. M., Stair Bldg., Toronto, Ont.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREENING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland, O.

SCREW MACHINE PRODUCTS
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Knight Metal Products, Ltd., Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Rivett Lathe & Grinder Co., Boston, Mass.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.

SCREW MACHINES, AUTOMATIC MULTIPLE SPINDLE
National Acme Co., Cleveland, Ohio.
Cincinnati Automatic Mach. Co., Cincinnati, O.
New Britain Machine Co., New Britain, Conn
Riverside Machinery Depot, Detroit, Mich.

SCREWS
Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont
United Brass & Lead Ltd., Toronto
Wilkinson & Kompass, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont
Wells Bros. Co. of Canada, Galt, Ont
Wilkinson & Kompass, Hamilton, Ont

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Garvin Machine Co., New York
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont

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Pollon F., 20 Maud St., Toronto

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Allen Mfg. Co., Hartford, Conn.
Bristol Co., Waterbury, Conn., U.S.A.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Lapoint Mfg. Co., Hartford, Conn

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Canada Machinery Corp., Galt, Ont
American Tool Works Co., Cincinnati, Ohio
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Gardner, Robt., & Son, Montreal
Garlock-Walker Machinery Co., Toronto, Ont
Hendey Machine Co., Torrington, Conn
Hamilton Mach. Tool Co., Hamilton, Ohio
Rhodes Mfg. Co., Hartford, Conn
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Can. Fairbanks-Morse Co., Montreal.
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No. 4

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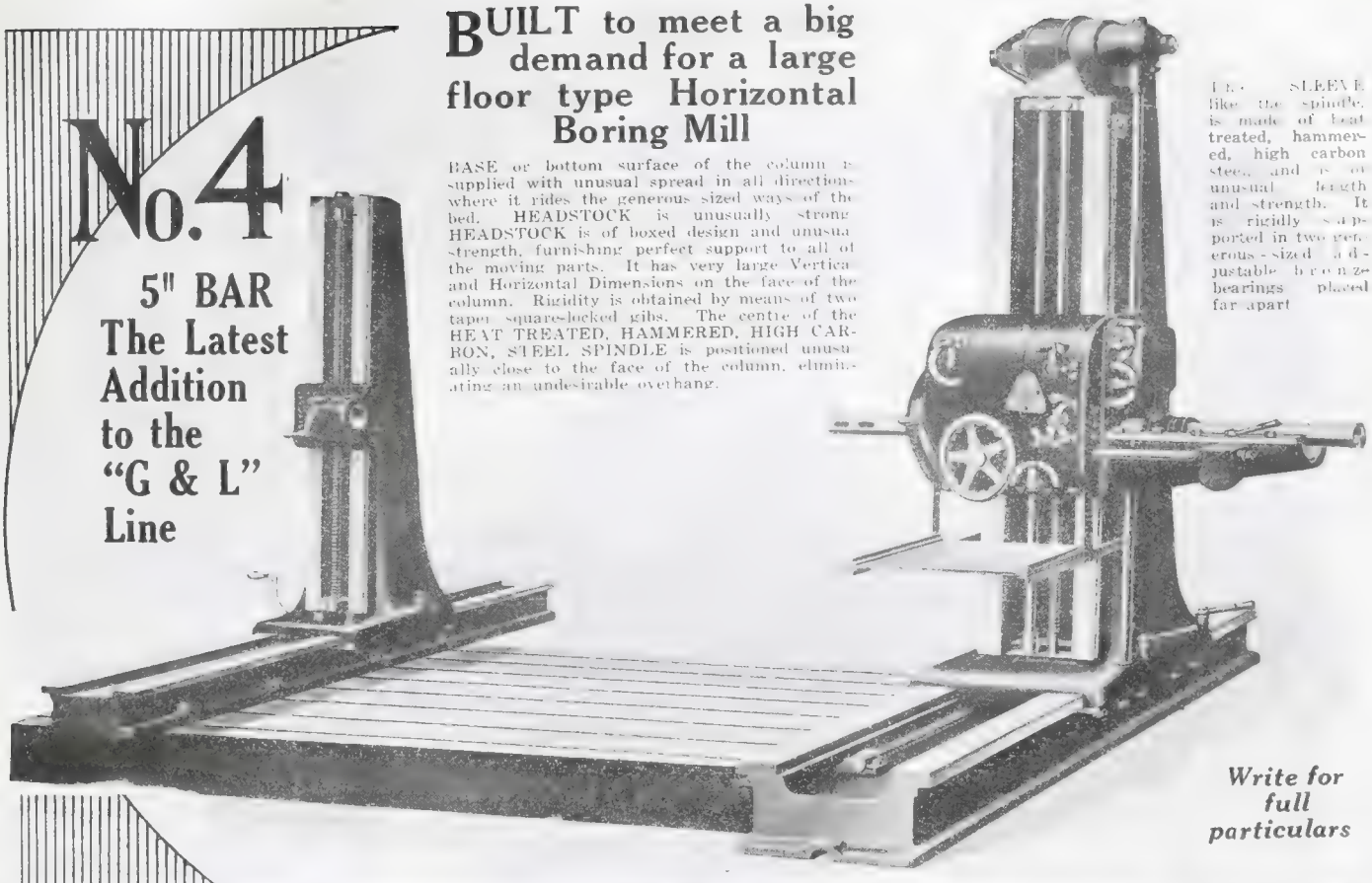

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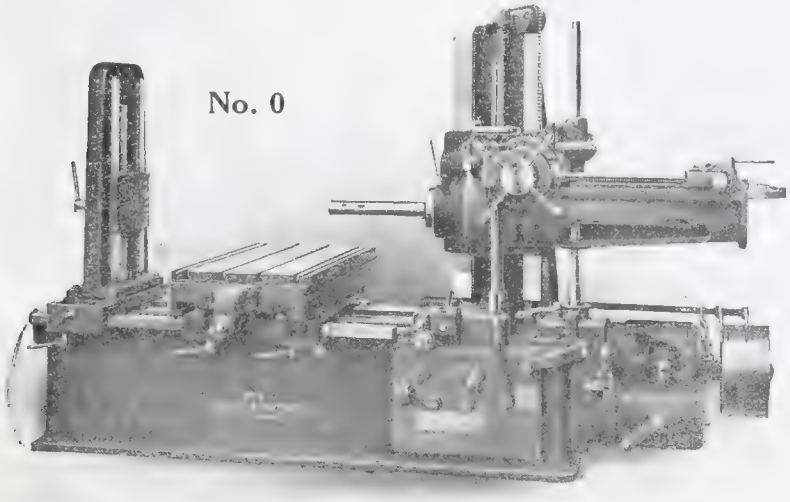

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Rice Lewis & Son, Toronto, Ont.
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Wilkinson & Kompass, Hamilton, Ont.
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Norton Co., Worcester, Mass.
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Bertrams, Ltd., Edinburgh, Scotland
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Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo

SHEARS, POWER
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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
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Canada Machinery Corp., Galt, Ont.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Wickes & Co., Saginaw, Mich.
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National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
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SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada
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Brown, Boggs & Co., Hamilton, Canada
Peck, Stow & Wilcox, Southington, Conn.
Steel Bending Brake Works, Ltd., Chatham, Ont.
Stoll Co., D. H., Buffalo, N.Y.

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SHELL FINISHING TOOLS
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Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

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Sheldons, Ltd., Galt, Ont.

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Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

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New Britain Mach. Co., New Britain, Conn.

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Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal
Williams & Co., J. H., Brooklyn, N.Y.

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Jones & Glassco, Montreal.

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Rice, Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilkinson & Kompass, Hamilton, Ont.

SLINGS, CHAIN
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York
Rhodes Mfg. Co., Hartford, Conn.

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Marsh Engineering Works, Belleville, Ont.

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Cleveland Twist Drill Co., Cleveland
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford Mass
Rice, Lewis & Son, Toronto, Ont.

SOCKET HEAD CAP SCREWS
Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Canada
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
United Brass & Lead Ltd., Toronto

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Rice, Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton
United Brass & Lead, Ltd., Toronto.

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Jones & Glassco, Montreal.

SPRINGS, MACHINERY
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Cleveland Wire Spring Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Jas. Steele, Ltd., Guelph, Ont.

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Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Crescent Mach. Co., Ltd., Montreal.
J. C. Wilson & Co., Belleville, Ont.
Cowan & Co., of Galt, Ltd., Galt, Ont.
Brown, Boggs & Co., Hamilton, Canada
Brown Engineering Corp., Toronto, Ont.
Can. Barker Co., Sault Ste. Marie, Ont.
Can. Rumely Co., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont
Ferracute Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
Hydraulic Machy. Co., Ltd., Montreal, Que.
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio.
Mulliner & Enlund Tool Co., Syracuse, N.Y.
Marten Machine Co., Hamilton, Ont.
Reed-Prentice Co, Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Smart-Turner Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Welland Motor & Machine Co., Welland, Ont.
Wilson & Co., J. C., Belleville, Ont.
William R Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPECIAL TOOLS
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Cleveland Milling Machine Co., Cleveland, O.

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Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
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Sleeper & Hartley, Inc., Worcester, Mass.

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Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CAST
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Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

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Homer & Wilson, Hamilton, Ont.
Wentworth Mfg. Co., Hamilton, Ont.

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Canada Machinery Corp., Galt, Ont.
Ferracute Mach. Co., Bridgton, N.J.
Noble & Westbrook Mfg. Co., Hartford, Conn.

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Matthews, Jas. H. & Co., Hartford, Conn.
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STARS, WHITE IRON
Katie Foundry Co., Galt, Ont.

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Canadian Morehead Co., Woodstock, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton

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Harvey & Co., Arthur C., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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Armstrong, Whitworth of Canada, Montreal, Que
Baker & Co., Inc., H., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.
Firth & Sons, Thos., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Zenith Coal & Steel Products, Montreal, Que.

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Can. Brakeshoe Co., Sherbrooke, Que.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Swedish Crucible Steel Co., Windsor, Ont.

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Can. Drawn Steel Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

STEEL DERRICKS
Pollard Mfg. Co., Niagara Falls, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

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Firth & Sons, Thos., Montreal, Que.
Harvey & Co., Arthur C., Boston, Mass.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL FORGING BILLETS
Andrews Steel Co., Newport, Ky.

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Atkins & Co., Wm., Sheffield, Eng.
Kayser, Ellison & Co., Ltd., Montreal.
Baker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Ltd., Montreal.
Marshall & Co., Geo., Toronto, Ont.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., John, New York, N.Y.
Latrobe Electric Steel Co., Latrobe, Pa.
Plewes, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.
Zenith Coal & Steel Products, Montreal, Que.

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Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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Joliette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York, N.Y.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

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STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que.

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Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STOCK RACKS FOR BARS, PIPING, ETC.
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New Britain Machine Co., New Britain, Conn.

STOCKS, PIPE
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A. B. Jardine & Co., Limited, Hespeler, Ont.
Rice, Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
New Britain Machine Co., New Britain, Conn.

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Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

STRAND
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Dominion Bridge Co., Montreal, Quebec.
Dominion Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies, Ltd., Montreal, Que.

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Bowser & Co., Inc., S. F., Toronto, Ont.
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Dominion Bridge Co., Montreal, Quebec.
Goldie & McCulloch Co., Galt, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Marsh Engineering Works, Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd., Toronto.
Welding & Supplies, Ltd., Montreal, Que.

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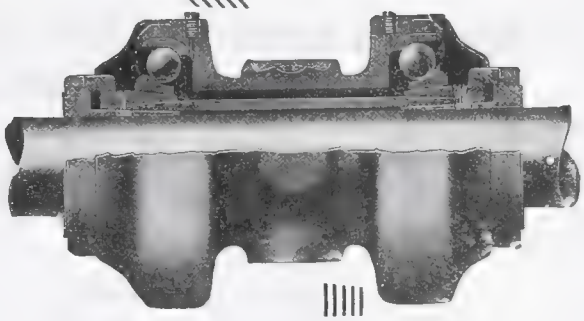

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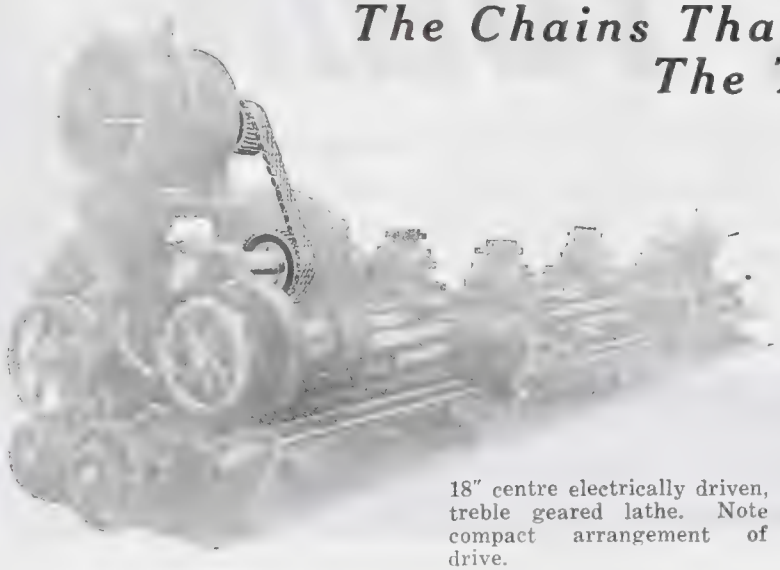

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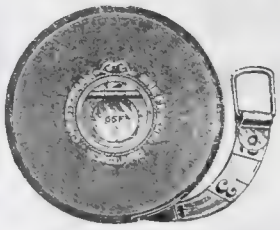

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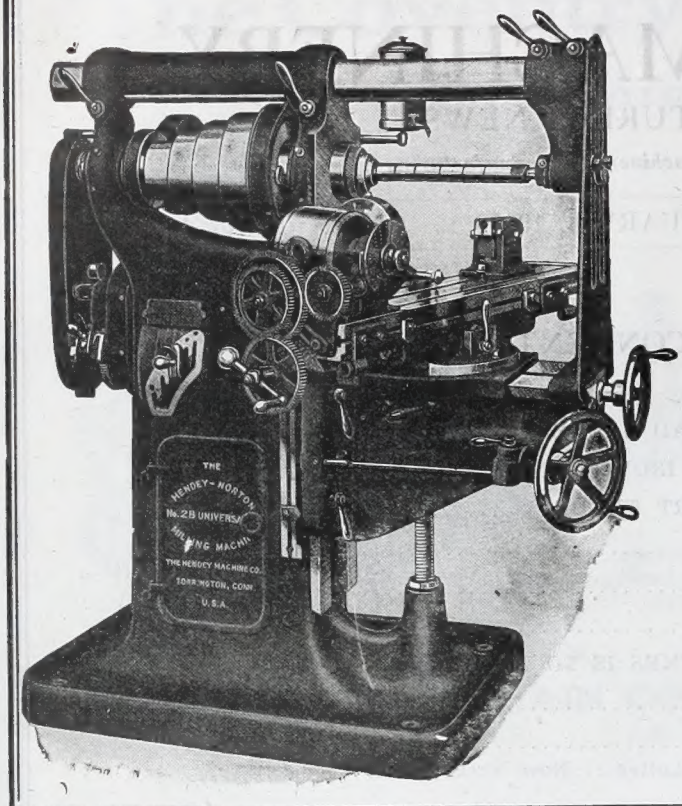

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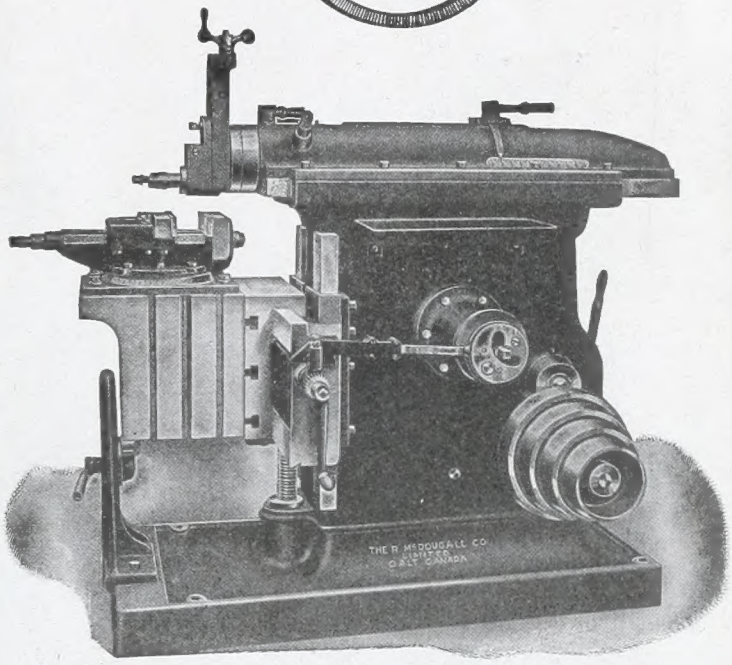

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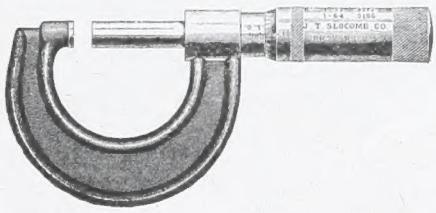

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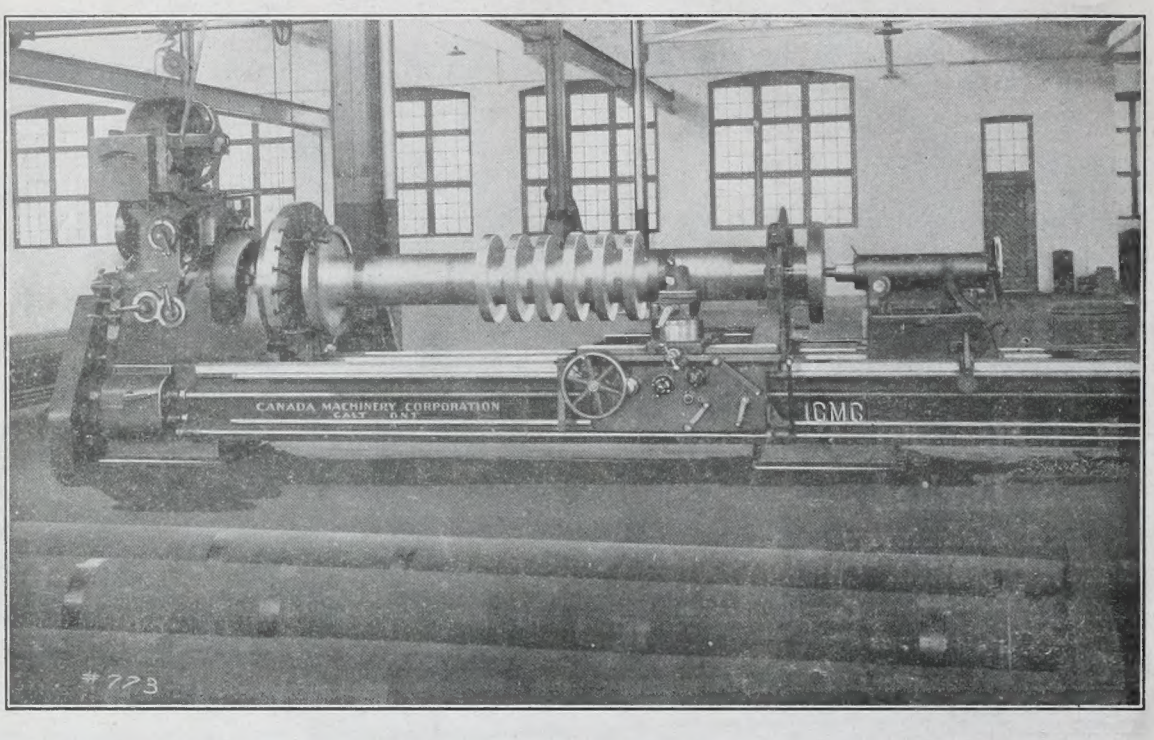

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